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ARCHIBALD BROWNING.

PIONEER BREEDER OF THE REAL AUSTRALIAN "DOWN" LAMB.

GEO. L. SUTTON, Director of Agriculture.

In one of the very attractive window displays arranged as part of the advertising campaign in connection with New Zealand Frozen Lambs, the following slogan was displayed:—

NEW ZEALAND LAMB: THE BEST IN THE WORLD.

A proud claim and, taken as a whole, a just one and surely a challenge to all breeders of lambs for export. Archibald Browning, of Yarrawonga, Victoria, so regarded and accepted it.

In 1925 Mr. Browning was in Great Britain and, as a breeder of lambs for the Victorian market, was considering the possibilities of extending his activities and catering for export trade to the Smithfield market. At that time the prices obtained for *all* Australian lambs were definitely and decidedly lower than those obtained for lambs from New Zealand. Mr. Browning determined to ascertain the cause of this unsatisfactory state of affairs with a view to remedying it, and decided to make inquiries at the very heart of the lamb trade, that is, from the buyers of our frozen lambs in the Smithfield Market. Supplied with the usual official introductions, he visited the markets and was shown around with great courtesy but received evasive replies to his pertinent question—"What is wrong with the Australian lambs?" Mr. Browning is persistent and thorough and so, nothing daunted, he continued to visit Smithfield, always seeking the answer to his question. Eventually he found a lamb salesman, Mr. Hamilton, manager of Hayes, Payne and Knowlden, who, possibly in exasperation, decided to risk offending this determined Australian by supplying him with the information he seemed so anxious to obtain. Mr. Hamilton commenced by asking—"What is *right* with the Australian lamb?" and then proceeded, "It is long shinned instead of plump legged and gives little satisfaction to my clients; much of it is too old and is really immature mutton instead of young, sappy lamb. You Australians are wool growers and obsessed with

the idea of a wool sheep, and seem unable to realise that at Smithfield meat, *not* wool, is required. To achieve success at Smithfield, the best *carcase* sheep and not the best *wool* or even a *dual purpose* sheep must be used to supply its requirements." Here, then, was very definite and reliable information from a fountain head, and though it might be unpalatable, it could not be disregarded by an earnest seeker after fundamental truths concerning the export lamb. The next step was to

ARCHIBALD BROWNING,
"Riverslea," Yarrawonga, Victoria.
The Pioneer of the Australian "Down" lamb.

examine thoroughly the best New Zealand carcases which were giving so much satisfaction; a close investigation of these showed that those used for display purposes were always of the *Southdown* type, evidently produced by mating Southdown rams with long wool ewes or with long wool crossbred ewes.

Because of his experience as a lamb breeder and his knowledge of the methods of the export lamb breeders, Mr. Browning concluded that the key to successful competition with New Zealand was the use of the Southdown ram, mated with long wool crossbred ewes.

Immediately on his return he placed an order with a local breeder for a line of Southdown rams and mated these with 400 long wool crossbred ewes. Later he

The Real Australian "Down" Lamb.—Pioneer shipment of the Yarrawonga Lambs, 1926.

turned them amongst another 800 ewes, the balance of his flock, and that year had 500 Southdown type lambs. Of these 265 were sent in due course (1926) to Smithfield. Compared with that of the usual Australian lamb, their quality was so exceptional that their arrival created a mild sensation, and at once and conclusively established the fact that Australia can produce lambs equal in quality and

superior in colour, to those of New Zealand. The illustration herewith shows portion of this first consignment as exhibited at Smithfield. Each year since then a further consignment, in one year 1,000, but usually 700 to 800, has been sent to Smithfield and always with the same excellent result.

So noteworthy is the quality and so excellent the colour of the "Browning" or "Yarrawonga" lambs that a few hundred, out of nearly twice as many millions of New Zealand and Australian lambs, have had special attention called to them in the trade papers each year. On 30th September, 1930, the Commonwealth Veterinary Officer at the Smithfield Market wrote:—"The 'Yarrawonga' Down cross lambs which have been so favourably received always, have invariably made ½d. per lb. more than the New Zealand and 1½d. per lb. more than G.A.Q. Australia," and, moreover, they have established for themselves such a good name that they can be disposed of in advance of their arrival at this margin.

When in London again, in 1930, Mr. Browning asked the foreman of the meat department of "Harrods" if they purchased Australian lamb, and was advised that he did not as the quality did not suit his customers, but he added, "We get a few of a special line that comes along every year. They are excellent quality and highly please our customers, who ask for further supplies which we cannot obtain. They are then dissatisfied with the quality of the best of the others." Seeing that he was speaking about the famous "Yarrawonga" lambs and to the breeder of them, but did not know it he was paying an unconscious, but very fine and well deserved compliment to Mr. Browning. It also goes to prove that if more special quality lambs were exported, the demand for them would still further improve with a continuity of supplies.

Mr. Browning is emphatic that in Australia there is a large area of country suitable for raising first class lambs. He states that on such country, in normal seasons and with proper treatment and attention, lambs will become as fat as seals on natural pasture and quite as prime as they do in some other countries with hand feeding. When nature is so good, why take second place to any country?

The town of Yarrawonga, after which these celebrated lambs have been named, is on the Victorian side of the Murray and is the head of a branch line running 40 miles Northwards from Benalla on the main line, Melbourne to Albury. It is 161 miles from Melbourne, whither the lambs are sent for treatment by a train which leaves Yarrawonga at about 2 p.m. and which arrives at the export works the next morning. They are slaughtered, weighed, and frozen during that day. The country is gently rolling until near the river, where it becomes much more level and, because of the trees, has a fine park-like appearance. At the time of my visit, 19th January, the natural feed was dry and interspersed with stubble. On the whole it was very similar to that found in our forest wheat areas.

The Yarrawonga district is a first class wheat growing area with a good winter rainfall. The average annual rainfall for the past 51 years to 1931 was 1,951 points. During that period it has ranged from 1,231 points in 1927 to 3,169 points in 1889. Of particular interest is the rainfall recorded since 1926, when the first shipment of the Browning lambs was made, and hereunder will be found the monthly rainfall recorded during that period.

Year.	Jan.	Feb.	Mch.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1926	33	...	282	458	215	271	213	237	144	157	17	91	2,118
1927	56	55	15	2	136	78	165	212	104	224	96	88	1,231
1928	240	336	460	120	128	188	132	48	101	140	1	66	1,960
1929	24	262	203	318	72	92	30	163	151	88	30	178	1,611
1930	...	3	93	100	142	39	86	233	*68	304	96	581	1,745
1931	101	43	343	305	594	543	151	116	122	147	193	4	2,662

Mr. Browning's farm, "Riverslea," is situated about three miles West of the town of Yarrawonga, and about 60 miles West of Albury. It consists of 2,000 acres of gently rolling land, and is a typically good wheat farm of rich red loam, valued at not less than £16 per acre before the present depression began. The land is capable of producing up to 36 bushels of wheat per acre, and has yielded over a number of years on well fallowed land an average of 25 bushels. Up till 1931 Mr. Browning grew wheat on a bigger scale. At present from 500 to 600 acres are cropped annually on fallowed land, as it is found that cultivation is necessary in order to secure the best grazing results. It is found that the best feed, mostly trefoil, is obtained in the stubbles the first season after cropping, the land coming back into pasture very quickly. Of the area under crop, about 100 acres are planted with oats, also after fallow, in order to supplement, if necessary, the natural feed available for the ewes and lambs.

The property has over a mile of frontage to the River Murray. There are also 60 acres of river land graded, etc., and used for irrigation, and of these about 30 acres are under lucerne which is largely grazed at certain periods by a small stud of Southdowns and the house cows. Lucerne hay is also made from this plot. Some 30 acres are sown with barley in the early autumn to provide green feed for the lambing ewes that may show signs of sickness after being on the dry feed throughout the summer.

A breeding flock of about 1,200 ewes is carried, and these are purchased, not bred on the farm. Mr. Browning is willing to use almost any long woolled ewes, but he is very particular about obtaining good types and will wait a long time to secure a suitable line. A straight line of even type, early drop, station bred ewes is what he aims at getting every three years, with 56 to 58 grade of wool. The line must be of good conformation, preferably with straight even backs and the tail well set, etc. At the time of my visit, owing to the difficulty of securing lines of this type, the flock had been kept on longer than usual, and had been supplemented to the required number. In the line were first cross ewes from the Merino by Border Leicester, Romney and Lincoln rams, and a few large well-set comebacks, the line keeping to the standard of wool previously mentioned. Mr. Browning states, "There is no better ewe to breed the shapely export lamb than that produced by crossing the Border Leicester ram with the big Merino ewe, and if men in the store sheep belt or drier agricultural areas would encourage this style of breeding and concentrate more on shape, they would find the business a profitable undertaking, and they would help to overcome one of the greatest difficulties in the export lamb business in Australia to-day, viz., the difficulty of securing suitable ewes for breeding prime lambs. As it is at present carried out many of our lamb breeders are endeavouring to breed export lambs from ewes which were culls themselves from previous seasons. Excellent ewes for export lamb breeding are produced by mating Merino ewes with either English Leicester, Border Leicester, Lincoln or Romney Marsh pure bred rams, but even with this mating, to achieve the best results, severe culling is necessary."

His invariable practice of securing his ewes in a single line led him to lose, in 1930, a very fine lot of Border Leicester crossbred ewes which he liked and which were secured by a friend of his. Mr. Browning later on judged some of the progeny at a country show; he considered that they were, if anything, better than his own lambs. This view was confirmed later by the following extract from a letter sent from London to the manager of the Western and Murray Co-op., Ltd., which treated the lambs:—

> "You might be good enough to extend to Mr. Bott my hearty congratulations for producing such fine specimen of the ovine; in fact I am safe in saying they excelled the famous Yarrawonga lot—a more level line one could not wish for."

This is eloquent testimony to the value of the Border Leicester crossbred as a mother for the export lambs and confirms Mr. Browning's preference for it. He considers that the conformation is specially suitable, because of its fine, level back.

In addition to the flock of 1,200 long wool ewes, the farm also carries a small stud of about 75 Southdowns. The Southdown stud has been established to supply flock rams of the blocky, low-set type desired for the production of the Australian Down lamb. To place at the head of this Southdown flock, Shripney Ramsay Mac has been imported from the Shripney Stud, Essex, England, and, at the time of my visit, was in quarantine. He is a thick- low-set animal, with boldness and character. Mr. Browning has been unfortunate in his importations, as two previous rams died, the first one whilst in quarantine and the second as the result of an accident. He has also imported several high class ewes. The first ram imported was an outstanding animal for, as a ram lamb, he not only won in his class at the great Southdown Show at Chicester, but also obtained a unique victory by winning championship honours when competing with adult animals. This was the first time in the history of this great show and sale that the championship was won by a ram lamb, and on this occasion there were 800 rams and approximately 4,000 ewes from registered flocks competing.

Mr. Browning is definitely of the opinion that his success is due to the use of the Southdown ram which, he states, is the only ram to use for the production of choice export lambs. He is confident that, whilst other rams will produce good lambs, none of them will produce the special lamb which is required on the London market, particularly when the market is not buoyant.

Despite his noteworthy and outstanding achievements in connection with the production of special quality export lambs, there are settlers in Victoria and even in his own district, who disagree and claim, as do some in Western Australia, that other breeds are "just as good." So far the results obtained have not justified such a belief. As opposed to the belief in the value of the "just as good" sire are the following details relative to some lambs bred during the past season on a well known property on the Murray in Riverina. A number of consignments were exported to Smithfield, and the particulars of the first three trucks are available. These lambs were bred from ewes which could be termed mostly first cross, and the rams used were Southdowns, Dorset Horn and Border Leicester. The different breeds of rams were mixed together with the ewes in the same paddock, under exactly the same conditions. When the lambs were considered fit for market they were drafted in the usual way through the race, and the three trucks consigned on the same day to the Western and Murray works. On arrival and after being slaughtered the parcel was graded in the following manner:—

114 1st grade Southdown cross lambs, average frozen weight 34.6 lb.

214 1st grade Australian lambs, Dorset Horn and Border Leicester cross, and 39 2nd and 3rd grade Australian lambs, Dorset Horn and Border Leicester cross, average frozen weight 34.9 lb.

On arrival at Smithfield the consignment was sold on the same market with the following results:—

Southdown Cross-bred Lambs (114)—	£	s.	d.
Average weight 34·6 lbs.			
Gross return, London	1	4	7
Less London charges	0	1	5
	1	3	2
Plus exchange	0	7	6
Total	£1	10	8

Australian Lambs.

Dorset Horn and Border Leicester Cross-bred Lambs (253)—

	£	s.	d.
Average weight, 34·9 lbs.			
Gross return, London	0	19	6
Less London charges	0	1	5
	0	18	1
Plus exchange	0	5	5
	£1	3	6

Relative London Returns.

Breeding of Lamb.

Ram—	Ewe—	£	s.	d.
Southdown	Longwool Crossbred	1	10	8
Dorset Horn / Border Leicester	Longwool Crossbred	1	3	6
	Difference	£0	7	2

The relative rates per lb. for the four different quality grades ruling at that time were:—

1st Down lambs	8.52 pence.
1st lambs	7.08 pence.
2nd lambs	5.79 pence.
3rd lambs	5.50 pence.

It is stated that a corresponding discrepancy existed throughout the season with the other consignments from this property, consisting of about 4,000 lambs in all.

Mr. Browning's practice is to mate the ewes at the beginning of December so as to have the lambs commencing to drop at the beginning of May. He experiences no difficulty in mating at this time, and believes that this is largely due to his practice of purchasing ewes bred in districts to the North of Yarrawonga, *i.e.*, in drier and earlier districts. During the summer the ewes are fed on wheat stubbles and dry natural grass which may be in the other paddocks. The average percentage of lambs marked is 90 per cent. At lambing time the ewes are carefully watched and every two or three days the newly dropped lambs and their mothers are removed from the remainder of the flock and placed upon the best feed available. Everything is subordinated to the welfare and the rapid growth of the lambs. To this end they are given a frequent change of paddocks. Even though there may be no improvement in feed, Mr. Browning is definitely of the opinion that it is advisable to give the ewes and lambs a frequent change. The paddocks are about 100 to 320 acres in area. Under normal conditions the lambs are ready for despatch to the export works when about four months old. As soon as the first lot is ready for market scales are taken into the yards and remain there until the season is over. The scales are used to check the judgment regarding the smallest lambs and any lamb otherwise satisfactory and weighing 65 lb. or over is sent to the works.

Hereunder are some details relative to the first consignment of two trucks of Browning lambs set away during the season just ended.

Incidentally they also furnish interesting information regarding the precocity of the Southdown crossbred.

Details of first consignment of Browning lambs, season 1931.

May 1st—First lamb dropped.
Aug. 30th—Two trucks lambs despatched to Western & Murray Co-op.
Aug. 31st—Lambs slaughtered, weighed and frozen.
Sept. 9th—Lambs shipped per T.S.S. "Bendigo."
Nov. 6th—Total proceeds received Yarrawonga per telegraphic transfer.

Returns:	£	s.	d.
Average frozen weight of lambs—32½ lb. at 9d.	1	4	4.5
Exchange 30⅜ per cent.	0	7	4.8
Total	£1	11	9.3

Only lambs which comply with a certain standard are exported. Those which are stunted or misshapen or do not conform to the Southdown type are rigorously culled out and sent to the Melbourne market. What is Mr. Browning's standard may be judged from the following scale of points which Mr. Browning has set up for judging export lambs and export carcases:—

The Browning Scale of Points.

Export Lambs:	Points.
Type and general conformation (low set, compact body, short legs and neck, level and broad back with wide, flat loin)	15
Back and loins from the neck to the setting of the tail	10
Breech and depth of quarters	10
Evenness of pen as regards matching	10
Value of skin	5
	50

Export Carcases:	
Correct amount of fat and proportion of lean flesh to fat ..	15
Back and filling over the loins	10
Depth and twist of meat on all four quarters	10
Colour and bloom	10
Weight (maximum points to be awarded to weight grade 2—28 to 36 lb.)	5
	50

The adherence to the standard set involves a retention of 10 per cent. of the drop, but it has earned for Mr. Browning a very valuable "goodwill" for quality and reliability and, in consequence, as pointed out by the Commonwealth Veterinary Officer at Smithfield, the Yarrawonga lambs can be sold in advance at ½d. per lb. above the best New Zealand lamb.

Archibald Browning's achievement has not only brought honour to his district, but has rendered signal service to the Commonwealth, the extent of which it is difficult to evaluate. With a keen desire for service, he is desirous that the benefits which have accrued to him should be secured by all Australian producers of export lambs. The advantage of colour which he has shown that Australian lambs possess is nature's gift to Australia, but his improvement in quality has been due to

the breeding practice adopted and the husbandry skill used to bring the advantages of that practice to their full fruition. Like Columbus, Mr. Browning has charted the new track; our responsibility is to follow it and increase the individual and national income. Just what that increase may be, may be gauged by the fact that not ten per cent. of the three million Australian lambs exported are of the Southdown type and these, at present, are worth 1½d. lb. more than the first grade Australian lamb, but it is believed that when the percentage of the Southdown type lamb is very much greater, the general effect will be to raise also the price level of the better grades of the other type.

THE "ROYAL" AND DISTRICT AGRICULTURAL SOCIETIES' 50-ACRE CROP COMPETITIONS, 1931.

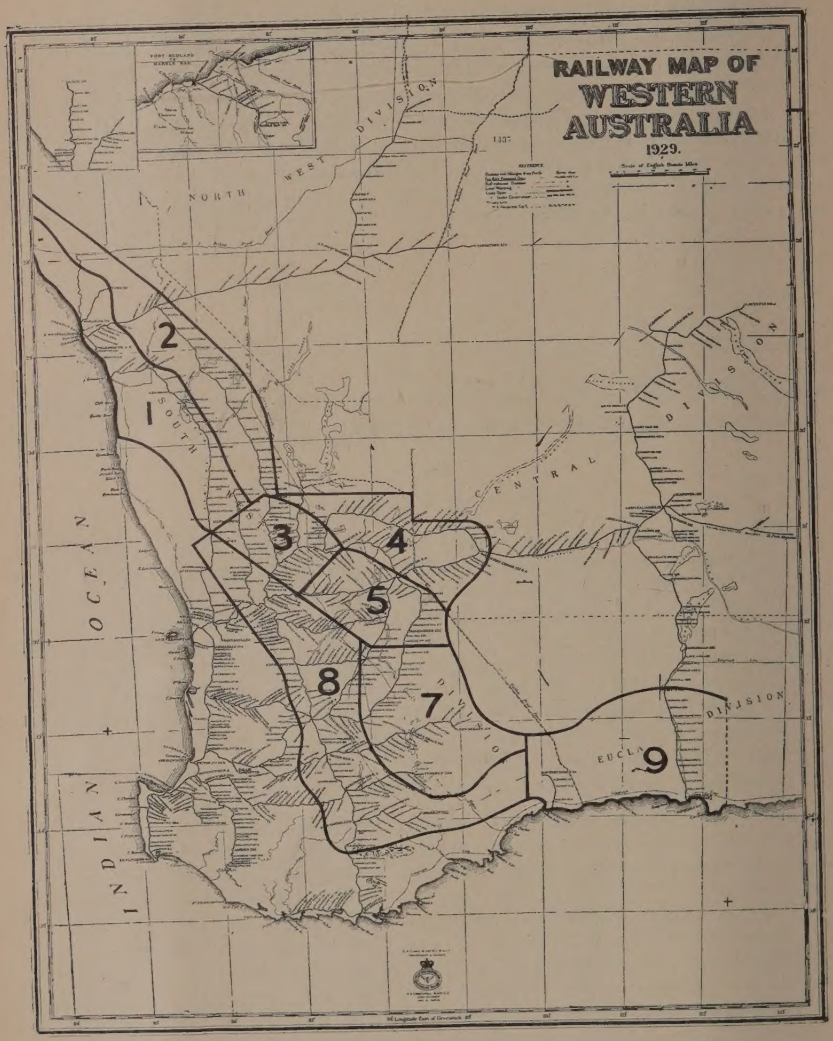
I. THOMAS,
Superintendent of Wheat Farms.

Eleven years ago the first Royal Crop Competition in this State was conducted. Starting in a small way, with fifteen entries, the crop competitions have grown in importance and improved in technique, until to-day they occupy no mean part in the life of the agricultural community. In the earlier competitions the entries were received direct by the Royal Agricultural Society, but in 1923 affiliated District Agricultural Societies were encouraged to conduct district crop competitions, and the first and second prize winners of each district competition competed for the Zone Championships. This effected a very considerable improvement in the number of entries. Farmers living in localities where no district competition is being conducted are not debarred from competing, as they are permitted to make their entry direct with the Royal Agricultural Society.

As can be readily understood, there is a considerable variation in rainfall, soil, etc., in a wheat belt so widely scattered, extending, as it does, from Ajana in the North to Scaddan in the South-East. A subdivision has therefore been made, and the wheat belt divided into eight zones, in such a manner that districts having similar interests and climatic conditions have been grouped together. This division was made in 1925 and has remained unchanged, excepting for a few alterations, the most important of which were the creation of a new zone, No. 9, in 1929, to embrace the Ravensthorpe and Esperance areas, and the elimination of No. 6, which was absorbed into No. 8. This division of the wheat belt has the added advantage of making it possible for the one judge to inspect all the competing crops in the one zone. The accompanying map shows the eight zones referred to.

In each of these zones a championship prize of £10 and a second prize of £2 10s. are awarded. The competitors eligible for these awards are the first and second prize winners of the competitions held by the affiliated district Agricultural Societies, and those competitors who have entered direct with the Royal Agricultural Society, because of no district competition being conducted in their own district.

In addition to these zone prizes the Royal Agricultural Society each year offers a special prize of £5 5s. to the competitor in any zone obtaining the highest calculated bushel yield per acre. This prize was first offered in 1925.



The conditions of the competitions require that the crop shall be grown on fallowed land, shall not be less than 50 acres in area, of one variety, and shall be judged under the following scale of points:—

Yield	50 points
Freedom from weeds	10 „
Freedom from disease	10 „
Freedom from admixture	15 „
Evenness of growth	15 „
Total	100 „

The system adopted has been to allot one point for each calculated bushel yield, which is determined not by estimation, but upon that calculated from portions of the crop obtained from small areas taken systematically throughout the crop. These samples are then threshed and the grain weighed.

As an indication of the improvement in yields, brought about by these competitions, it is interesting to note the alteration to the scale of points for yield, rendered necessary by the increased yields of the leading competitors, as is illustrated in the following table:—

Year.	Scale of Points for Yield.	Highest bushel yield in Competition.
		Bus.
1921	30	...
1922	30	...
1923	35	40
1924	35	36
1925	40	36
1926	40	38
1927	40	40
1928	40	40
1929	50	46
1930	50	43
1931	50	42

Since the inception of the Royal and District Crop Competitions, the judges have been departmental officers attached to the Wheat Branch of the Department of Agriculture.

The awards and judges' reports, together with a detailed analysis of the cultural details of all competitors, have been prepared and will be found in the following pages:—

ZONE 1.

Judge—I. THOMAS, Superintendent of Wheat Farms.

Royal Society, 6 Competitors; Three Springs Society, 5 Competitors.

Total, 11 Competitors.

THREE SPRINGS AGRICULTURAL SOCIETY.

The rainfalls for Three Springs and Arrino were as follow:—

	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sep.	Oct.	Total.	Nov.	Dec.	Total for year.
Arrino	...	...	8	47	459	194	290	193	205	67	1,408			
Three Springs ...	...	...	10	35	499	161	282	191	171	63	1,367	85	44	1,541

The awards made and the cultural details are tabulated hereunder:—

THREE SPRINGS AGRICULTURAL SOCIETY.

Judge: I. THOMAS, Superintendent of Wheat Farms.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
Hebiton, J. K., Senr.	Three Springs	Merredin ...	40	8	8	13	14	83
Durack, P. M. ...	Arrino ...	Merredin ...	34	8	8	11	13	74
McKenzie, N. ...	Three Springs	Merredin ...	30	9	8	13	13	73
Thomas, C. E. ...	Three Springs	Federation ...	32	7	7	11	14	71
Hebiton, J. K., Jnr.	Three Springs	Merredin ...	29	7	7	13	13	69

CULTURAL DETAILS

Competitor.	No. of years cropped.	Timber.	When ploughed.	Condition of land.	Implement	Depth.	Subsequent cultivation.	Variety.	Planted.	Rate of seed.	Rate of Super.	Seed treatment.	Graded.	Disease.
Hebiton, J. K., sen.	5th	York gum	Sept.	Fairly good	Part mould-board, part disc	in. 3 4	Springtyne cultivated Oct., and again prior to seeding. Planted with combined cultivator drill	Merredin	Early May	lb. 60	lb. 80	Copper carbonate	Yes	Small isolated patches of Takeall.
Durack, P. M.	5th	York gum	Sept.	Good	Disc	3	None. Planted with combined cultivator drill	Merredin	1st week June	50	45	No	No	Traces Ball and Loose Smut
McKenzie, N.	6th	York and salmon gum	July	Good	Disc	3	Fed off with sheep. Planted with combined cultivator drill with harrows attached	Merredin	Middle May ...	45	60	Copper carbonate	Yes	Trace of Takeall
Thomas, C. E.	? Old land	Morrell, York gum, little salmon gum	Aug. and Sept.	Good	Disc	3	Re disced May. Planted with combined cultivator drill with harrows attached	Federation	1st week June	60	70	Copper carbonate	Yes	Small patches Takeall and traces of Ball Smut.
Hebiton, J. K., jun.	...	...	...	...	...	...	... ...	Merredin	... ...	...	...	...	...	Takeall in number of small patches and trace Ball Smut

ROYAL AGRICULTURAL SOCIETY.

Zone 1.

The following are the rainfalls as recorded at the centres where the crops entered direct with the Royal Agricultural Society were grown:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Coorow	...	2	4	53	310	132	310	210	174	69	1,205	76	66	1,406
Carnamah	...	...	12	60	431	167	302	265	204	128	1,497	51	52	1,672
Watheroo	...	...	...	95	449	170	415	331	209	46	1,620	10	42	1,767

The awards made and the cultural details are as set out below:—

ROYAL AGRICULTURAL SOCIETY.

Judge: I. THOMAS, Superintendent of Wheat Farms.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
Forrester, J. K. ...	Carnamah ...	Nabawa ...	37	8	8	13	14	80
Bothe, B. D. ...	Coorow ...	Bena ...	35	8	8	13	14	78
Rudduck, A. ...	Coorow ...	Nabawa ...	32	9	8	14	14	77
Cunning, A. S. ...	Carnamah ...	Merredin ...	35	7	8	12	14	76
Hillers & Robertson	Watheroo ...	Waratah ...	32	8	7	13	13	73
Green, J. W. ...	Carnamah ...	Merredin ...	33	7	7	13	13	73

CULTURAL DETAILS.

Competitor.	No. of years cropped.	Timber.	When ploughed	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Seed treatment.	Graded.	Disease.
						in.				lb.	lb.			
Forrester, J. K.	About the 8th	Heavy York gum	June	Good	Disc	3½	Springtyne cultivated Aug. and again in Sept. Harrowed Oct. Planted with combined cultivator drill	Nabawa	Middle of May	55	112	Copper carbonate	Yes	Little Takeall.
Bethe, B. D.	About the 10th	Salmon gum	July	Good	Mouldboard	4	Disc cultivated Sept. Planted with combined cultivator drill	Bena	2nd week May	55	90	Copper carbonate	Yes	Small patch Takeall and trace Flag Smut.
Ruddock, A.	? Old land	Salmon gum and gimlet	July	Good	Mouldboard	4	Tandem disc cultivated last week Aug. Planted with disc drill	Nabawa	2nd week April	48	168	*Nil*	Yes	Little Takeall.
Cumming, A. S.	At least 10th	Salmon gum and gimlet	June-July	Good	Disc	4	Harrowed Sept., again Oct. Harrowed before seeding with a sunderseeder (Heavy disc cultivator)	Merredin	3rd week May	60	100	Copper carbonate	Re-cleaned	Little Takeall.
Hilfers & Robertson	? Old land	Salmon gum and gimlet	June-July	Good	Mouldboard and disc	2½ 3	Skim ploughed with disc implement late Sept. Springtyne cultivated late Oct. Harrowed Feb. Springtyne cultivated prior to seeding. Planted with combined cultivator drill	Waratah	3rd week May	60	85	*Nil*	No	Little Takeall and Ball Smut.
Green, J. W....	? Old land	Salmon gum	June-July	Good	Disc	3 4	Part re-ploughed. Planted with combined cultivator drill	Merredin	20th–23rd May	60	90	Copper carbonate	Yes	Little Takeall and traces Ball and Flag Smut.

ZONE 2.

Judge—F. L. SHIER, B.Sc.(Agric.), Agricultural Adviser.

Royal Society, 2 Competitors.

ROYAL AGRICULTURAL SOCIETY.

Zone 2.

Only two crops, both entered direct by the Royal Agricultural Society, were submitted for inspection in Zone 2.

The following tables show the rainfalls for the centres, the awards, and the cultural details of the crops inspected:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Indarra	...	...	9	83	378	163	366	311	186	60	1,464	6	43	1,605
Ajana	...	...	33	82	330	105	333	193	116	59	1,136	25	88	1,364

ROYAL AGRICULTURAL SOCIETY.

Judge : F. L. SHIER, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
T. Moore	Indarra ...	Merredin ...	30	9	9	13	14	75
F. A. Porter ...	Ajana ...	Geeralying ...	22	9	9	13	14	67

CULTURAL DETAILS.

Competitor.	No. of years cropped.	Timber.	When ploughed.	Implement.	Depth.	Subsequent cultivations.	Variety.	Rate of Seed.	Rate of Super.	Seed treatment.	Graded.	Disease.
Mowry, T. ...	4th crop ...	Yorkgum and and jam	June ...	Disc ...	in. $3\frac{1}{2}$–4	Springtyne cultivated Aug. and again in Sept. Planted with combined cultivator drill	Merredin	lb. 60	lb. 90	Copper carbonate	Re-cleaned ...	Trace Takeall.
Porter, F. A. ...	1st fallow	Yorkgum and scrub	July ...	Disc ...	3–$3\frac{1}{2}$	Disced during summer	Geeralying	50	112	Copper carbonate	Re-cleaned ...	Trace Takeall.

ZONE 3.

Judge—R. P. ROBERTS, B.Sc.(Agric.), Agricultural Adviser.

Royal Society, two competitors.

ROYAL AGRICULTURAL SOCIETY.

Zone 3.

In Zone 3 also, only two crops were inspected. Both these were entered direct with the Royal Agricultural Society.

The following tables show the rainfalls for the centres, the awards, and the cultural details of the two crops inspected:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Goomalling ...	...	8	13	81	257	136	266	320	139	52	1,170	5	67	1,344
Cowcowing ...	...	13	16	181	239	147	162	224	146	65	983	3	13	1,209

ROYAL AGRICULTURAL SOCIETY.

Judge: R. P. ROBERTS, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
Woodfield, N. ...	Goomalling...	Gluclub ...	35	8	8	13	12	76
Jones, W. W. ...	Cowcowing...	Nabawa ...	30	9	9	13	14	75

CULTURAL DETAILS.

Competitor.	Timber.	No. of years cropped.	When ploughed.	Condition of Land.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Disease.
Woodfield, N. ...	Salmon gum and light thicket	Over 12	July	Wet ...	Mouldboard	in. 3½	Springtyne cultivated Oct. Scarified in May. Planted with a disc drill	Gluclub	Middle May	lb. 53	lb. 90	Takeall.
Jones, W. W. ...	Salmon gum, gimlet, and scrub	8 10	June-July	Good ...	Disc ...	4	Ploughed back with subsoil cut in Aug. Springtyne cultivated prior to seeding. Planted with disc drill	Nabawa	Last week April	45	70	Traces of Takeall and Bunt.

Both competitors graded and treated seed with copper carbonate.

ZONE 4.

Judge—R. P. ROBERTS, B.Sc.(Agric.), Agricultural Adviser.

Nungarin Society, 10 Competitors; Mt. Marshall Society, 2 Competitors.

Total, 12 Competitors.

NUNGARIN AGRICULTURAL SOCIETY.

The rainfalls for Nungarin and other centres are as follow:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Nungarin ...	...	3	2	202	271	119	184	223	97	93	987	57	21	1,272
Mukinbudin ...	...	...	0	101	269	82	174	133	112	80	850	30	25	1,015
Mangowine ...	...	...	8	97	238	151	120	152	123	52	836			
Bonnie Rock ...	...	7	4	74	255	102	219	106	109	67	858	178	8	1,129

The awards made and the cultural details are set out hereunder:—

NUNGARIN—EASTERN DISTRICTS AGRICULTURAL SOCIETY.

Judge: R. P. Roberts, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
Landsell, G. ...	Mukinbudin	Gluyas Early	31	8	9	13	14	75
Creagh Bros. ...	Kwelkan ...	Gluyas Early	30	9	7	14	13	73
Williams, F. ...	Mangowine...	Carrabin ...	27	8	9	14	13	71
Harris, E. G. S. ...	Mukinbudin	Gluyas Early	26	9	8	13	14	70
Jones, D.	Kwelkan ...	Nabawa ...	27	8	7	13	14	69
Hodges, W. S. ...	Nungarin ...	Merredin ...	26	8	7	12	13	66
Manuel, C. J. ...	Mukinbudin	Gluyas Early	22	8	8	14	13	65
Fitzpatrick, R. ...	Nungarin ...	Geeralying ...	24	8	8	11	12	63
Watson Bros. ...	Nungarin ...	S.H.J. ...	21	8	8	13	12	62
Richardson Bros. ...	Bonnie Rock	Merredin ...	16	9	8	12	12	57

CULTURAL DETAILS.

Competitor.	Timber.	No. of years cropped.	When ploughed	Condition of land.	Implement	Depth	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Seed treatment.	Graded.	Disease.
						in.				lb.	lb.			
Landsell, G. ...	Salmon gum, gimlet, jam, and mallee	4th crop	June	Good ...	Sundercut	3	Springtyne cultivated Oct., and again prior to seeding. Planted with a disc drill	Gluyas Early	1st week May...	39	83	Copper carb.	Yes	Traces Takeall and Flag Smut.
Creagh Bros.	Salmon gum, gimlet, and Yorrel	Old land	July	Wet ...	Disc ...	3 4	Rigid tyne scarified, Sept. Planted with combined cultivator drill	Gluyas Early	Last week May	45	90	Copper carb.	Yes	Flag Smut and trace Ball Smut.
Williams, F. ...	Salmon gum and gimlet	Old land	June	Good ...	Rigid tyne scarifier	3	Harrowed in July. Rigid tyne scarified and harrowed Aug. Harrowed prior to seeding. Planted with a combined cultivator drill	Carrabin	14th May ...	45	75	Copper carb.	Yes	Trace Takeall.
Harris, E. G. S.	Salmon gum and gimlet	Abt. 4th	June	Good ...	Scarifier	3	Scarified in Aug. Planted with combined cultivator drill	Gluyas Early	1st week May...	40	80	Copper carb.	No	Traces Flag Smut and Ball Smut.
Jones, D.	Salmon gum and gimlet	15th crop	July	Good ...	Disc ...	4	Springtyne cultivated Sept., again in Oct. Springtyne cultivated prior to seeding. Planted with combined cultivator drill	Nabawa	End April, beginning May	45	90	Copper carb.	No	Patches of Takeall.
Hodges, W. S.	Salmon gum, gimlet, teatree, and some light land	Old land	June - July	Good ...	Disc ...	3	Cultivated with sundercut in Aug. Springtyne cultivated in Sept., Springtyne cultivated beforeseeding. Planted with disc drill	Merredin	1st fortnight May	45	85	Copper carb.	Yes	Some Flag Smut and trace of Takeall.
Manuel, C. J.	Salmon gum and little gimlet	Old land	July	Wet ...	Mouldboard	3½	Disc. cultivated with sundercut Sept. Springtyne cultivated Dec. after rain. Springtyne cultivated before seeding. Planted with disc drill	Gluyas Early	1st fortnight May	40	90	Copper carb.	Yes	Traces Flag Smut and Takeall.

CULTURAL DETAILS—*continued.*

Competitor.	Timber.	No. of years cropped.	When ploughed	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of Super.	Seed treatment.	Graded.	Disease
										lb.	lb.			
Fitzpatrick, R.	Morrell, gimlet and jam	Old land	June	Wet ...	Part with sundercut, then all crossed with scarifier	3	Scarified in Sept. Part scarified and part springtyne cultivated prior to seeding. Planted with combined cultivator drill	Geeralying	2nd week May	45	70	No	Re-cleaned	Little Smut and traces Ball Take-all
Watson Bros.	Salmon gimlet, and jam scrub	No crop in previous 5 years	July	Good ...	Sundercut	3	Springtyne cultivated prior to seeding. Planted with combined cultivator drill	S.H.J.	Middle May ...	48	60	Copper carb.	Re-cleaned	Little Take-all
Richardson Bros.	Salmon gum, gimlet and boree	New land	...	...	...	...	No cultivations previous to planting with combined cultivator drill	Merredin	8th May ...	36	50	Copper carb.	Yes	Bunt and traces of Flying Smut and Take-all

MT. MARSHALL AGRICULTURAL SOCIETY.

The following table shows the rainfalls as recorded at Bencubbin and North Bencubbin during the year:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Bencubbin		1	2	86	290	82	126	195	94	56	843	23	14	969
Nth. Bencubbin ...		...	...	79	226	107	170	133	124	82	842	68	19	1,008

The awards made and the cultural details are set out hereunder:—

MT. MARSHALL AGRICULTURAL SOCIETY.

Judge: R. P. ROBERTS, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of Growth. 15 points	Total. 100 points.
Hopwood, B. W. G.	Bencubbin ...	Bencubbin ...	28	9	9	13	13	72
Thomson, M. ...	North Bencubbin	Nabawa ...	24	8	9	12	14	67

CULTURAL DETAILS.

Competitor.	No. of years cropped.	Timber.	When ploughed	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of Super.	Seed treatment.	Graded.	Disease.
						in.				lb.	lb.			
Hopwood, B. W. G.	Abt. 8	Mallee and scrub	June-July	Good	Disc. (Sundercut)	3½	Springtyne cultivated Sept. Planted with combined cultivator drill	Bencubbin	May 5th ...	38	90	None	Yes	Traces of Takeall
Thomson, M.	Abt. 4	Salmon gum and gimlet	July	Good	Heavy disc	4	Springtyne cultivated in Oct. Planted with combine cultivator drill	Nabawa	May 3rd ...	42	56	Copper carb.	Yes	Traces of Takeall

ZONE 5.

Judge—G. L. THROSSELL, Agricultural Adviser.

Bruce Rock Society, 5 Competitors; Doodlakine-Baandee Society, 2 Competitors; Merredin Society, 7 Competitors. Total, 14 Competitors.

BRUCE ROCK AGRICULTURAL SOCIETY.

The following table shows the rainfalls as recorded at the centres concerned in the Bruce Rock competition:—

	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sep.	Oct.	Total.	Nov.	Dec.	Total for year.
(Rosedale) Yarding	...	..	39	53	200	129	234	302	117	52	1,034	13	51	1,190
Bruce Rock ...	...	...	9	160	221	184	216	325	142	44	1,082	16	54	1,321
Emu Hill ...	...	...	11	114	259	148	247	320	132	36	1,142			

The awards made and the cultural details of the competing crops are set out below:—

BRUCE ROCK AGRICULTURAL SOCIETY.

Judge: G. L. THROSSELL, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
Smith, C. & Sons ...	Yarding ...	Gluclub ...	32	9	9	13	14	77
Allen Bros. ...	Central Kumunin	Gluclub ...	31	9	9	12	14	75
Farrall, F. C. & Sons	Yarding ...	Gluclub ...	29	8	8	12	13	70
Brown, S. A. ...	Bungulluping	Gluclub ...	28	8	8	12	13	69
Smith, C. & A. H. ...	Yalbarrin ...	Gluclub ...	26	9	8	12	13	68

CULTURAL DETAILS.

Competitor.	Timber.	No. of crops.	Rotation.	When ploughed.	Implement.	Condition of land.	Depth.	Subsequent cultivation.	Variety.	When planted.	Rate of Seed.	Rate of Super.	Graded.	Disease.
							in.				lb.	lb.		
Smith, C. & Sons	Jam, scrub and mallee	Since 1923	3 yrs. Fallow, wheat stubble	End July	Disc ...	Good ...	4	Re-ploughed end Aug.-Sept.	Gluclub	1st week May ...	50	90	Yes	Takeall and Flagsmut.
Allan Bros. ...	Gimlet ...	1st	2 yrs. Fallow, wheat	End June	Disc cultivator	Good ...	3	Springtyne cultivated Aug.	Gluclub	3rd week April	45	100	Yes	Trace Flagsmut and Takeall.
Farrall, F. C. & Sons	Salmon, gimlet and morrel	Since 1912 and 1921	3 yrs. Fallow, wheat stubble	June	Mouldboard	Good ...	4	Disc cultivated Aug. Springtyne cultivated end April and prior seeding	Gluclub	Mid May ...	51	103	Yes	Takeall.
Brown, S. A.	Salmon and gimlet	Since 1914	2 yrs. Fallow, wheat	June-July	Mouldboard	Good ...	3	Rigidtyne scarified Aug.-Sept. Springtyne cultivated Sept.-Oct. Rigidtyne scarified prior seeding	Gluclub	3rd week May	50	87	Yes	Takeall and Bunt.
Smith, C. & A. H.	Salmon, gimlet and morrel	?	3 yrs. Fallow, wheat stubble	June-July	Mouldboard	Good ...	3	Disc cultivated Aug. Springtyne cultivated Sept.	Gluclb	2nd week May	40	90	...	Bunt.

Combined cultivator-drills were used by all competitors and all seed wheat was treated with copper carbonate.

DOODLAKINE-BAANDEE AGRICULTURAL SOCIETY.

The rainfall as recorded at Doodlakine during the year, the awards made, and the cultural details of the two competing crops in the Doodlakine-Baandee competition are tabulated hereunder:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Doodlakine ...	...	...	5	218	232	116	171	286	99	51	955	151	10	1,339

DOODLAKINE-BAANDEE AGRICULTURAL SOCIETY.

Judge: G. L. THROSSELL, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
Prowse Bros. ...	Doodlakine...	Gluyas Early	30	8	7	14	13	72
Prowse, A. E. C. ...	Doodlakine...	Gluyas Early	25	7	8	14	12	66

CULTURAL DETAILS.

Competitor	Timber.	No. of crops.	Rotation.	When ploughed.	Implement.	Condition of land.	Depth.	Subsequent cultivations.	Variety.	When planted.	Rate of Seed.	Rate of Super.	Disease.
							in.				lb.	lb.	
Prowse, Bros. ...	Salmon, gimlet, mallee, and scrub	Since 1911	3 years. Fallow, Wheat, Stubble	End July	Disc ...	Good ...	4	Springtyne cultivated Sept., and prior seeding. Planted with combined cultivator drill.	Gluyas Early	End May ...	45	100	Takeall.
Prowse, A. E. C.	Gimlet ...	Since 1912	2 years. Fallow, Wheat	June	Disc ...	Good ...	4	Springtyne cultivated Sept. Harrowed after seeding. Planted with combined cultivator drill	Gluyas Early	End May ...	45	100	Takeall.

Both competitors graded and treated wheat with copper carbonate.

MERREDIN AGRICULTURAL SOCIETY.

The rainfalls, as recorded in the Merredin district, are as follow:—

	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Merredin ...	...	8	2	225	286	128	253	268	107	68	1,060	42	49	1,386
Nukarni ...	...	5	6	257	225	119	193	204	102	72	915	62	21	1,266
Totadgin ... (Belka)	...	...	...	235	210	149	301	342	141	58	1,201	45	17	1,498
Nangeenan ...	...	54	4	191	218	115	197	257	81	44	912	24	40	1,225
S. Walgoolan ...	...	...	26	176	275	156	246	286	116	47	1,126	34	64	1,426
Koonadgin ... (Only Hope)	...	...	19	192	289	109	247	286	83	48	1,062			

The awards and cultural details are tabulated hereunder:—

MERREDIN AGRICULTURAL SOCIETY.

Judge: G. L. THROSSELL, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
Cook, W. T. ...	S. Walgoolan	Merredin ...	35	9	8	13	13	78
Lambert, J. B. ...	Koonadgin ...	Gluclub ...	32	9	8	12	13	74
Smallacombe, T. H.	Nangeenan	Carrabin ...	31	8	8	13	13	73
Merredin Meat Co.	Merredin ...	Noongaar ...	27	8	8	13	13	69
Maughan Bros. ...	Nukarni ...	Gluclub ...	24	8	8	13	13	66
Cockram, W. H. ...	Nukarni ...	Gluyas Early	24	8	7	11	13	63
Teasdale, H. W. ...	Totadgin ...	Nabawa ...	18	7	7	13	12	57

CULTURAL DETAILS.

Competitor.	Timber.	No. of Crops.	Rotation.	When ploughed	Implement	Condition of Land.	Depth.	Subsequent cultivations.	Variety.	When planted.	Rate of Seed.	Rate of Super.	Disease.
							in.				lb.	lb.	
Cook, W. T. ...	Gimlet, morrel and mallee	6	2 years. Fallow, Wheat	July	Disc cultivator	Good ...	4	Springtyne cultivated Aug. Rigidtyne scarified Sept. Springtyne cultivated after rain end April. Planted with combined cultivator drill	Merredin	1st week May	43	112	Takeall, Flag Smut.
Lambert, J. B....	Gimlet A.	4	2 years. Fallow, Wheat	June	Disc cultivator	Good ...	4	Springtyne cultivated Sept. Planted with combined cultivator drill	Gluclub	Last week April	43	93	Traces Flag Smut, Takeall, and Bunt.
Smallacombe, T. H	Salmon, gimlet and mallee	?	2 years. Fallow, Wheat	July	Disc ...	Good ...	3	Disc cultivated Sept. Springtyne cultivated prior seeding. Planted with combined cultivator drill	Carrabin	Last week May	53	93	Takeall.
Merredin Meat Co.	Salmon, gimlet, teatree and mallee	?	3 years. Fallow, Wheat, Stubble	June	Mouldboard	Good ...	3–4	Springtyne cultivated mid. Aug. Rigid tyne scarified Sept. Planted with combined cultivator drill	Noongaar	End May ...	50	90	Takeall, Flag Smut.
Cockram, W. H.	Salmon, gimlet, morrel and teatree	Since 1911	3 years. Fallow, Wheat, Stubble	July	Disc cultivator	Good ...	4	Disc cultivated Aug. Harrowed Jan. Springtyne cultivated prior seeding. Harrowed after. Planted with a disc	Gluyas Early	3rd week May	50	75	Takeall, Bunt, Flag Smut.
Teasdale, H. W.	Gimlet and salmon	Since 1911	3 years. Fallow, Wheat, Oats	June-July	Mouldboard	Very hard	3–4	Rigid tyne scarified Sept. Planted with combined cultivator drill	Nabawa	3rd week April	43	90	Takeall.

ZONE 7.

Judge—G. L. THROSSELL, Agricultural Adviser.

Karlgarin Society, 5 Competitors; Kulin Society, 8 Competitors; Lake Grace Society, 4 Competitors. Total, 17 Competitors.

KARLGARIN AGRICULTURAL SOCIETY.

The rainfalls, as recorded at the Karlgarin centres during the year, are as follow:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Karlgarin ...	...	...	18	98	177	148	195	341	173	31	1,065			
Hyden Rock ...	...	5	17	122	123	150	152	293	165	46	929	26	24	1,123

The awards and cultural details are set out hereunder:—

KARLGARIN AGRICULTURAL SOCIETY.

Judge: G. L. THROSSELL, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
Ray, J. G. ...	N. Karlgarin	Gluyas Early	24	9	9	13	14	69
Grant, L. J. ...	Karlgarin ...	Nabawa ...	21	8	8	13	13	63
Clayton, R. G. ...	Hyden Rock	Nabawa ...	16	9	9	14	13	61
Biglin, E. J. ...	Karlgarin ...	Gluyas Early	17	8	8	13	12	58
Read, A. C. ...	Karlgarin ...	Nabawa ...	14	8	8	13	12	55

CULTURAL DETAILS

Competitor.	Timber.	No. of Crops.	Rotation.	When ploughed	Implement.	Condition of Land.	Depth.	Subsequent cultivations	Variety.	When Planted.	Rate of seed.	Rate of super.	Disease.
							in.				lb.	lb.	
Ray, J. G. ...	Gimlet and mallee	4	4 years. Fallow, Wheat, Oats, Pasture	2nd week June	Disc ...	Good ...	4	Rigid tyne scarified Aug. and mid-Sept. and prior seeding with a disc	Gluyas Early	1st week May	39	60	Traces Flag Smut and Takeall.
Grant, L. T. ...	Salmon, gimlet and mallee	2	2 years. Fallow, Wheat	2nd week June	Disc cultivator	Good but weedy	3-4	Disc cultivated July. Planted with combined cultivator drill	Nabawa	End April ...	34	45	Takeall.
Clayton, R. G. ...	Salmon, morrel, mallee, merrit and teatree	3	2 years. Fallow, Wheat	June	Disc cultivator	Wet ...	3	Disc cultivated Sept. Springtyne cultivated Oct. (dry). Planted with combined cultivator drill	Nabawa	End April ...	45	55	Takeall.
Biglin, E. J. ...	Morrel, salmon, merrit and gimlet	5	2 years. Fallow, Wheat	Early Aug.	Disc ...	Good ...	3-4	Springtyne cultivated early Sept. Planted with combined cultivator drill	Gluyas Early	1st week May	45	50	Flag Smut, Bunt, and Takeall.
Read, A. C. ...	Salmon, gimlet and morrel	3	3 years. Fallow, Wheat, Stubble	End June	Disc cultivator	Good ...	4	Springtyne cultivated Aug. Planted with combined cultivator drill	Nabawa	2nd week June	45	90	Trace Takeall and Bunt.

All competitors graded and treated seed wheat with copper carbonate.

KULIN AGRICULTURAL SOCIETY.

The rainfalls, as recorded at the Kulin centres during the year, are as follow:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Kulin	...	25	69	54	250	135	228	369	254	54	1,290	19	70	1,527
Kulin Rock ...	...	7	40	30	201	105	170	349	198	48	1,071	16	62	1,226
Gnarming ...	...	14	48	31	195	111	218	361	209	52	1,146	16	59	1,314
Jitarning ... (Deeplish)	...	23	37	71	208	128	202	351	289	59	1,237	13	47	1,428

The awards and cultural details are tabulated hereunder:—

KULIN AGRICULTURAL SOCIETY.

Judge: G. L. THROSSELL, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of growth. 15 points.	Total. 100 points.
Freebairn, F. S. ...	Jilakin ...	Gluclub ...	31	9	8	13	13	74
Forsyth, Mrs. E. ...	Jitarning ...	Waratah ...	28	9	8	14	13	71
Henderson, Mrs. F. H. R.	Gnarming ...	Merredin ...	26	9	8	13	14	70
Trotter, A. W. ...	Kulin Rock	Free Gallipoli	25	9	8	13	14	69
Meikle, P.	Kulin Rock	Nabawa ...	23	8	8	12	12	63
Bowey & Baldock	Kulin ...	Nabawa ...	21	9	8	13	12	63
Nichols, R. ...	Kulin Rock	Merredin ...	20	9	7	14	12	62
Forsyth, A B. ...	Jitarning ...	Hard Federation	20	8	8	13	13	62

CULTURAL DETAILS.

Competitor.	Timber.	No. of Crops.	Rotation.	When ploughed	Implement	Condition of Land.	Depth.	Subsequent cultivations.	Variety.	When planted.	Rate of Seed.	Rate of Super.	Disease.
Freebairn, F. S.	Gimlet and morrel	?	3 years. Fallow, Wheat, Oats	Mid-Aug.	Disc ...	Wet ...	in. 4	Rigid tyne scarified end Sept., part in early May. Planted with combined cultivator drill	Gluclub	Mid-May ...	lb. 60	lb. 90	Traces Flag Smut and Takeall.
Forsyth, Mrs. E.	York gum, salmon and jam	5	3 years out. Fallow, Wheat	End June	Mouldboard	Good ...	3	Disc cultivated dry April and 1st week May. Planted with combined cultivator drill	Waratah	Mid-May ...	40	100	Traces Flag Smut and Takeall.
Henderson, Mrs. F. H. R.	Salmon, morrel	?	3 years. Fallow, Wheat Oats	...	...	...	...	... ...	Merredin	Last week June	52	60	Flag Smut, Bunt.
Trotter, A. W. ...	Jam ...	6	2 years. Fallow, Wheat	June	Disc ...	Good ...	4	Reploughed Aug. Planted with combined cultivator drill	Free Gallipoli	Mid-May ...	60	90	Flag Smut and Bunt.
Meikle, P. ...	Gimlet ...	?	3 years. Fallow, Wheat Oats	July-Aug.	Mouldboard	Good ...	3	Disc cultivated end Sept. Planted with combined cultivator drill	Nabawa	1st week May	40	90	Takeall and Bunt.
Bowey and Baldock	Salmon and mallee	2	2 years. Fallow, Wheat	Mid-Aug.	Scarifier	Good ...	2-3	None. Planted with combined cultivator drill	Nabawa	2nd week May	50	77	Takeall and Bunt.
Forsyth, A. B. ...	Salmon, morrel, York and jam	3	Out 2 years. Fallow, Wheat	Early June	Mouldboard	Good ...	3	Disc cultivated first week May. Planted with combined cultivator drill	Hard Federation	2nd week May	40	100	Takeall and Flag Smut.
Nichols, R. ...	Salmon ...	2	2 years. Fallow, Wheat	July	Disc ...	Good ...	4	Disc cultivated end Aug. Springtyne cultivated prior to seeding. Planted with a disc	Merredin	Mid-May ...	50	90	Flag Smut, Mildew, Takeall.

All seed wheat graded and treated with copper carbonate.

LAKE GRACE AGRICULTURAL SOCIETY.

The rainfalls, as recorded at the Lake Grace centres during the year, are as follow:—

	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Lake Grace ...	...	37	36	65	223	149	183	379	229	45	1,208	67	46	1,459
Burngup ... (Dulwich Hill)	...	26	22	36	177	88	154	295	188	65	967	11	51	1,113

The awards and cultural details are set out hereunder:—

LAKE GRACE AGRICULTURAL SOCIATY.

Judge: G. L. THROSSELL, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of Growth. 15 points	Total. 100 points.
Collinson & Fleay...	Burngup ...	Gluclub ...	29	9	8	13	14	73
Bishop, S. H. ...	Lake Grace	Waratah ...	18	8	8	13	13	60
Bishop, H. F. ...	Lake Grace	Nabawa ...	19	7	7	13	12	58
Fry, E. H.... ...	North Lake Grace	Nabawa ...	18	7	7	12	12	56

CULTURAL DETAILS.

Competitor.	Timber.	No. of years cropped.	Rotation.	When ploughed	Implement	Condition of land.	Depth.	Subsequent cultivations.	Variety.	When planted.	Rate of Seed.	Rate of Super.	Seed treatment.	Graded	Diseases.
Collinson & Fleay	Morrel, yorrel, salmon and gimlet	2	3 years. Fallow, Wheat, Oats	Aug.	Disc ...	Good	in. 4	Springtyne cultivated prior to seeding. Planted with a disc	Gluclub	End May ...	lb. 60	lb. 90	Copper carbonate	...	Bunt. Trace Takeall.
Bishop, S. H.	Salmon, gimlet and yorrel	Since 1911	3 years. Fallow, Wheat, Stubble	July	Mouldboard	Good	4	Disc cultivated Aug. Springtyne cultivated Sept. Disc cultivated prior seeding. Planted with disc	Waratah	1st week June	45	90	Copper carbonate	Yes	Takeall.
Bishop, H. F.	Salmon, blackbutt, gimlet and and boree	Since 1920	4 years. Fallow, Wheat, Wheat, Oats	Aug.	Disc cultivator	Wet	3	Harrows behind plough. Planted with a combined cultivator drill	Nabawa	Mid-April ...	45	93	Copper carbonate	Yes	Takeall.
Fry, E. H. ...	Salmonand morrel	4	3 years. Fallow, Wheat, Oats	June-July	Mouldboard	Good	4	Springtyne cultivated Aug. Cross harrowed Sept. Planted with combined cultivator drill	Nabawa	2nd week April	50	112	Copper carbonate	Yes	Takeall.

ZONE 8.

Judge—A. S. WILD, B.Sc.(Agric.), Agricultural Adviser.

Royal Society, 5 Competitors: Wickepin Society, 6 Competitors; Nyabing Society, 3 Competitors; Gnowangerup Society, 15 Competitors. Total, 29 Competitors.

ROYAL AGRICULTURAL SOCIETY.

Zone 8.

The following are the rainfalls as recorded at the centres where the crops entered direct with the Royal Agricultural Society were located:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sep.	Oct.	Total.			
Borden	...	20	112	89	194	126	117	301	277	43	1,058	40	60	1,379
Gnowangerup ...	...	13	135	117	186	145	172	295	335	37	1,170	9	74	1,518
Quairading ...	...	...	21	52	284	141	238	418	193	41	1,315	18	94	1,500
S. Caroling ... (Woodstock)	...	...	27	48	217	118	149	298	264	47	1,093	6	109	1,283

The awards and cultural details are tabulated below:—

ROYAL AGRICULTURAL SOCIETY.

Judge: A. S. WILD, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
Murray, W. G. ...	Borden ...	Yandilla King	39	9	9	13	14	84
Lohoar, J. P. & Sons	S. Quairading	Gluclub ...	36	9	8	13	13	79
Richards, A. ...	S. Caroling...	Nabawa ...	34	9	8	14	13	78
Wellard & Wellard	Gnowangerup	Nabawa ...	35	8	9	13	13	78
Taylor, H. E. & Sons	Quairading ...	Gluclub ...	33	8	8	13	13	75

CULTURAL DETAILS.

Competitor.	No. of years cropped.	Timber.	When ploughed.	Condition of Land.	Implement.	Depth.	Subsequent cultivations.	Variety	Planted.	Rate of Seed.	Rate of Super.	Disease.
Murray, W. G. ...	Old land ...	York gum, morrel, and jam	Aug.	Hard ...	Mouldboard	in. 3	Springtyne cultivated in Oct., again in Nov., and again in March. Planted with combined cultivator drill	Yandilla King	Mid-May ...	lb. 49	lb. 112	Trace Takeall.
Lahoar, J. & Sons	(?)	Gimlet and salmon	Aug.	Fair ...	Mouldboard	4–5	Springtyne cultivated in Oct. and again just before seeding	Gluclub	Late May ...	45	90	Trace of Takeall. Trace of Bunt.
Richards, A. ...	Old land	Yorkgum, morrel and salmon	July	Good ...	Mouldboard	3½	Springtyne cultivated in Sept., again early in Oct., and again just before seeding	Nabawa	2nd week May	52	125	Trace of Takeall. Trace of Flagsmut.
Wellard & Wellard	Old land	Salmon, Yorkgum, mannagum and morrel	June	Good ...	Disc ...	3	Disced 2in. deep in Oct. Springtyne cultivated in April, again in May. Planted with combined cultivator drill	Nabawa	Early June...	60	90	Trace of Takeall.
Taylor, H. E. & Sons	Old land	Gimlet and salmon	July	Good ...	Rigidtyne scarifier	3	Rigidtyne scarified 2½in. deep in Sept. and again just before seeding. Planted with combined cultivator drill	Gluclub	Late May ...	50	100	Trace of Flying Smut and traces Takeall.

All competitors graded and treated seed with copper carbonate.

WICKEPIN AGRICULTURAL SOCIETY.

The rainfalls, as recorded during the year at the Wickepin centres, are as follow:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Tinkurrin (Tovil) ...	...	29	40	111	243	150	184	391	432	25	1,425	30	115	1,750
Malyalling ...	...	3	14	113	241	138	173	338	326	37	1,253	74	52	1,509
Wickepin ...	...	6	22	99	288	171	287	477	386	13	1,622	69	46	1,864

The awards made and the cultural details of the competing crops are set out below:—

WICKEPIN AGRICULTURAL SOCIETY.

Judge: A. S. WILD, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
Murray, A.... ...	Tinkurrin ...	Canberra ...	33	9	7	14	13	76
Hosken Bros. ...	Dorakin ...	Gallipoli ...	31	9	9	13	13	75
Dalton, L. C. ...	Malyalling ...	Rajah ...	28	8		13	13	71
Cook & Hutton ...	Dorakin ...	Gallipoli ...	27	8	9	13	13	70
Fleay, E. G. ...	Wickepin ...	Gluclub ...	28	9	7	12	13	69
Lewis, A. R. & Sons	86 Gate ...	Hard Federation	24	9	8	14	13	68

CULTURAL DETAILS.

Competitor.	No. of years cropped.	Timber.	When ploughed.	Condition of land.	Implement.	Depth.	Subsequent cultivation.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Seed treatment.	Graded.	Disease.
Murray, A. ...	2nd crop	Salmon, yorkgum and morrel	July	Fair	Mouldboard	in. 4	Disced 2in. deep at end of Oct. Springtyne cultivated early in May. Planted with combined cultivator drill. Harrowed just after	Canberra	Late May ...	lb. 55	lb. 90	No	Yes	Traces of Bunt, Takeall and Flying Smut
Hosken Bros.	Old land	Salmon, morrel, and yorkgum	July	Good	Mouldboard	3–4	Springtyne cultivated Sept., and portion again in Oct. Planted with combined cultivator drill attached with light harrows	Gallipoli	2nd week May	60	60	Copper carb.	Yes	Trace of Takeall.
Dalton, L. C.	Old land	Jam and yorkgum	Sept.	Varying	Mouldboard	3½	Springtyne cultivated in Oct., and again just before planting. Drag harrows behind drill	Rajah	Late May ...	60	112	Copper carb.	Yes	Trace of Takeall.
Cook and Hutton	Old land	Jam, yorkgum and morrel	Aug.	Wet	Mouldboard	3 4	Springtyne cultivated in Sept., again in Oct., and planted with combined cultivator drill	Gallipoli	Late April	60	90	Formalin	Yes	Trace of Takeall.
Fleay, E. S. ...	4th crop	Morrel, Salmon, yorkgum and whitegum	July	Good	Mouldboard	4	Disced 2in. deep just before seeding. Planted with combined cultivator drill	Gluclub	Late April, and early May	50	61	Copper carb.	Yes	Traces of Takeall, Flying Smut and Bunt
Lewis, A. R. & Sons	Old land	Salmon, yorkgum and jam	Aug.	Fair	Disc.	3½	Springtyne cultivated just before planting and harrowed just after	Hard Federation.	Late May ...	45	90	Copper carb.	Yes	Trace of Takeall.

NYABING AGRICULTURAL SOCIETY.

The rainfalls, as recorded at Nyabing during the year, were as follow:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Nyabing	...	11	69	90	267	135	243	383	359	24	1,411	39	42	1,662

The awards and cultural details are tabulated hereunder:—

NYABING AGRICULTURAL AREA.

Judge: A. S. WILD, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
Slee, E. J. W. ...	Boongadoo...	Major ...	25	8	8	13	13	67
Charlsley, H. J. ...	Nyabing ...	Nabawa ...	24	7	8	13	13	65
Sargent, A. McD. ...	Boongadoo...	Major ...	19	7	7	13	12	58

CULTURAL DETAILS.

Competitor.	No. of years cropped.	Timber.	When ploughed.	Condition of land.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Seed treatment.	Graded.	Disease.
						in.				lb.	lb.			
Slee, E. J. W.	5th crop	Yorkgum, jam, and sheoak	Sept.	Boggy in patches	Disc	2½	Disced 2in. deep in Oct., and planted with combined cultivator drill	Major	Mid May ...	45	90	Formalin	Yes	Traces of Takeall and trace of Flying Smut
Charlsley, H. J.	Old land	Salmon-gum, morrel, and manna gum	July	Wet	Disc	4–5	Springtyne cultivated Oct., and again just before seeding	Nabawa	Mid May ...	35	70	No	Yes	Trace of Takeall and trace of Bunt.
Sargent, A. McD.	Old land	Morrel salmon, and jam	July-Sept.	Hard in patches	Disc	3½	Disced 2½in. deep just after ploughing. Planted with combined plough (disc) drill	Major	1st week May	50	85	Copper carb.	Yes	Takeall, and traces of Bunt, Flag Smut and Flying Smut.

GNOWANGERUP AGRICULTURAL SOCIETY.

The following table shows the rainfalls as recorded at Gnowangerup during the year:—

	Jan.	Feb.	Mar.	Apl.	Growing Period. May	June	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Gnowangerup ...	...	13	135	117	186	145	172	295	335	37	1,170	9	74	1,518

The awards and cultural details are tabulated hereunder:—

GNOWANGERUP AGRICULTURAL SOCIETY.

Judge: A. S. WILD, Agricultural Adviser.

Competitor.	Address.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of growth. 15 points.	Total. 100 points.
Beeck, H. O. ...	Gnowangerup	Yandilla King	42	9	8	13	14	86
Cockram, C. E. ...	Pallinup ...	Yandilla King	40	8	9	14	14	85
Formby, R. & Co., Ltd.	Gnowangerup	Yandilla King	38	9	9	14	13	83
McDonald, J. ...	Gnowangerup	Yandilla King	36	9	10	14	14	83
Ball, J. L. ...	Gnowangerup	Bena ...	37	9	9	13	13	81
Stewart, W. B. ...	Gnowangerup	Yandilla King	35	9	9	14	14	81
Tymms, H. O ...	Gnowangerup	Yandilla King	38	8	9	13	13	81
White, R. H. ...	Pallinup ...	Yandilla King	34	9	9	14	14	80
Schneider Bros. ...	Gnowangerup	Nabawa ...	35	8	8	13	13	77
Chambers, E. ...	Pallinup ...	Yandilla King	29	9	9	14	13	74
Garnett, J.... ...	Gnowangerup	Yandilla King	31	8	9	15	13	74
Taylor, C.	Pallinup ...	Yandilla King	29	9	9	14	13	74
Wright, E. H. ...	Pallinup ...	Yandilla King	29	8	9	14	13	73
Johnston, Alf. ...	Gnowangerup	Nabawa ...	27	8	9	14	13	71
Whyatt, C. A. ...	Pallinup ...	Yandilla King	28	9	7	14	12	70

CULTURAL DETAILS.

Competitor.	No. of years cropped.	Timber.	When ploughed	Condition of land.	Implement.	Depth.	Subsequent cultivations	Variety.	Planted.	Rate of Seed.	Rate of Super.	Seed Treatment.	Graded.	Disease.
						in.				lb.	lb.			
Beeck, H. O.	Old land	Salmon and morrel	April, 1930	Good ...	Rigidtyne scarifier	2½	Springtyne cultivated May, 1930. Rigidtyne cultivated Aug., 1930, and again May, 1931. Planted with combined cultivator drill and harrowed immediately after	Yandilla King	Mid-May ...	50	80	Copper carbonate	Yes	Trace Takeall and Flying Smut.
Cockram, C. E.	Old land	Yorkgum, salmon and morrel	July	Fair ...	Mouldboard	3	Springtyne cultivated in Oct., again in Mar. and again in April	Yandilla King	Mid-May ...	48	100	Copper carbonate	Yes	Trace Takeall.
Formby, R., & Co., Ltd.	Old land	Chiefly salmon	Early July	Good ...	Mouldboard	3½	Harrowed Aug., Springtyne cultivated early Sept., and again in April. Planted with combined cultivator drill	Yandilla King	Mid-May ...	45	90	Copper carbonate	Yes	Trace Flying Smut.
McDonald, J.	Old land	Salmon and Yorkgum	July and Aug., 1929	Good ...	Mouldboard	3½	Springtyne cultivated Oct., 1929, and again Mar., 1930. Mouldboard ploughed 2in. deep Aug., 1930. Springtyne cultivated, Oct., 1930, and again Mar., 1931. Planted with combined cultivator drill and harrowed immediately after	Yandilla King	Mid-May ...	55	90	Copper carbonate	Yes	
Ball, J. L. ...	3rd crop	Morrel and salmon	Early July	Good ...	Mouldboard	3	Disced 2in. deep early Sept. Springtyne cultivated Sept., and before seeding	Bena	Mid-May ...	45	90	Copper carbonate	Yes	Trace of Takeall.
Stewart, W. B.	3rd crop	Yorkgum and morrel	Early Aug.	Good ...	Mouldboard	3	Springtyne cultivated early Sept., again in March, and again in April. Planted with combined cultivator drill	Yandilla King	3rd week May	53	150	Copper carbonate	Yes	Trace of Takeall.
Tymms, H. O.	1st crop in 10 years	Yorkgum and morrel	July	Good ...	Mouldboard	4	Disced 2in. deep Feb., and again in front of drill, harrowed just after drill	Yandilla King	3rd week April	60	60	Copper carbonate	Yes	Trace Takeall and Flying Smut.

CULTURAL DETAILS—*continued.*

Competitor.	No. of years cropped.	Timber.	When ploughed	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Seed Treatment.	Graded.	Disease.
						in.				lb.	lb.			
White, R. H.	Old land	Yorkgum and morrel	Aug.	Good ...	Mould-board	4	Springtyne cultivated twice in Oct., again early in Nov., and again April. Planted with combined cultivator drill	Yandilla King	3rd week May	55	100	Copper carbonate	Yes	Trace Takeall.
Schneider Bros.	?	Yorkgum, salmon and morrel	Early Aug.	Little wet	Mould-board	3	Springtyne cultivated Sept. Harrowed in March. Springtyne cultivated in Mar. Planted with combined cultivator drill	Nabawa	End May ...	64	93	Copper carbonate	Yes	Trace Takeall and Flying Smut.
Chambers, E.	6th crop	Yorkgum, whitegum, and yate	Aug.	Good ...	Mould-board	4	Springtyne cultivated twice in spring and again in autumn. Planted with combined cultivator drill	Yandilla King	3rd week May	50	80	No	Yes	Trace Takeall.
Garnett, J. ...	12 years	Yorkgum, morrel, mallet and whitegum	Aug..	Slightly dry	Mould-board	3	Cultivated twice with duckfoot cultivator and twice harrowed	Yandilla King	1st week May	56	90	Bluestone	Yes	Trace Takeall.
Taylor, C. ...	2nd crop	Yorkgum, black mallee and morrel	Early June	Excellent	Disc chiefly, small portion mould-board	3	Portion springtyne cultivated in Sept., and again in Oct. Whole skim ploughed 2in. deep with mouldboard in Mar. Springtyne cultivated in April. Planted with combined cultivator drill	Yandilla King	Mid-May ..	60	93	Vitrolene	Yes	Trace Takeall.
Wright, E. H.	6th crop	Yorkgum, morrel, whitegum	July	Good ...	Mould-board	3	Springtyne cultivated in Sept., and again in Mar. Planted with combined cultivator drill	Yandilla King	Early May ..	60	80	Formalin	Yes	Trace Takeall.
Johnston, Alf	Old land	Salmon, morrel, sheoak, mannagum and whitegum	Aug.	Good ...	Mould-board	3	Rigidtyne cultivated and harrowed in spring. Rigidtyne cultivated just before seeding and harrowed just after	Nabawa	2nd week June	60	83	Copper carbonate	Yes	Trace Takeall.
Whyatt, C. A	6th crop	Morrel and Yorkgum	Aug.	Good ...	Mould-board	3½ 4	Springtyne cultivated in Sept., Oct., Mar., April, and again in front of drill	Yandilla King	Mid-May ...	45	60	No	Yes	Takeall.

ZONE 9.

Judge—L. G. SEINOR, Manager, Experiment Farm, Salmon Gums.

Southern Mallee Society, 23 Competitors.

SOUTHERN MALLEE AGRICULTURAL SOCIETY.

The only entries received in Zone 9 were those of the Southern Mallee Agricultural Society. The rainfalls recorded at the centres concerned are as follow:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Kumarl (Coggeshall)	5	175	3	75	271	206	159	374	96	78	1,184	99	...	1,541
Grass Patch ...	13	123	23	105	298	306	171	393	139	81	1,388	100	14	1,766
Scaddan	24	80	23	148	358	360	130	418	154	94	1,514	242	22	2,053
Red Lake ...	6	160	13	76	259	262	170	371	108	82	1,252	198	9	1,714
Salmon Gums ...	...	173	3	85	232	232	156	381	88	99	1,188	90	10	1,549

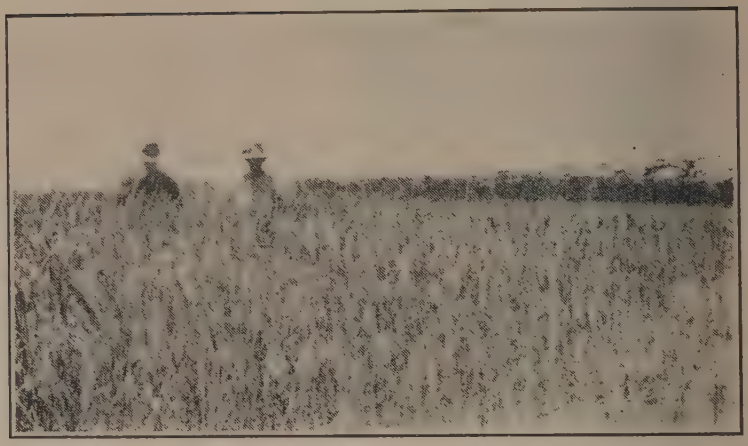
The awards made and the cultural details of the competing crops are tabulated hereunder:—

SOUTHERN MALLEE AGRICULTURAL SOCIETY, 1931.

ZONE 9.

Judge: L. G. SEINOR, Manager, Experimental Farm, Salmon Gums.

Competitor.	Address.	Variety.	Yield. 50 points	Freedom from Weeds. 10 points	Freedom from Disease. 10 points	Freedom from Admixture. 15 points	Evenness of growth. 15 points	Total. 100 points.
J. O'Brien	Kumarl ...	Nabawa ...	34	9	9	12	13	77
T. Haywood ...	E. Dowak ...	Gluyas Early	28	9	9	14	14	74
R. B. Johns ...	Grass Patch	Ford ...	26	9	9	14	14	72
N. Norton	East Salmon Gums	Nabawa ...	26	9	9	14	13	71
W. Barry	W. Dowak	Nabawa ...	26	9	9	14	13	71
R. Swan	East Salmon Gums	Nabawa ...	26	9	9	12	14	70
A. Guest	Beete ...	Gluyas Early	28	8	8	12	13	69
C. Flintham ...	Scaddan ...	Gluyas Early	24	8	8	14	13	67
Thomas Bros. ...	East Salmon Gums	Nabawa ...	25	8	8	13	12	66
Grigg Bros. ...	Scaddan ...	Gluyas Late	25	8	7	13	13	66
E. Prince	Kumarl ...	Bena ...	23	9	8	12	13	65
J. A. Webster ...	Treslove ...	Nabawa ...	23	9	8	13	12	65
A. Thomson ...	Red Lake ...	Gluyas Early	23	7	8	13	13	64
J. McCosh	Kumarl ...	Nabawa ...	19	9	8	14	13	63
W. F. McCrea ...	East Salmon Gums	Gluyas Early	22	8	9	12	12	63
J. Thomas ...	Kumarl ...	Gluyas Early	23	9	9	12	10	63
C. Berryman ...	Beete ...	Ford ...	20	8	8	12	14	62
N. Donovan ...	Kumarl ...	Nabawa ...	22	8	8	12	10	60
W. P. Southern ...	Scaddan ...	Nabawa ...	21	8	7	12	12	60
H. Sharpe	Treslove ...	Nabawa ...	18	8	7	13	12	58
W. Lunnon ...	Red Lake ...	Nabawa ...	19	6	7	13	13	58
N. Sedgwick ...	Red Lake ...	Nabawa ...	18	7	8	12	12	57
D. R. Richie ...	Grass Patch	Nabawa ...	16	7	6	13	10	52



J. O'Brien's Winning Crop of "Nabawa," No. 9 Zone.
Calculated yield 34 bushels.

T. Haywood's crop of "Gluyas Early," second prize winner, No. 9 Zone.
Calculated yield 28 bushels.

CULTURAL DETAILS.

Competitor.	Years cropped.	Timber.	When ploughed.	Condition of land.	Implement.	Depth	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Graded.	Disease.
						in.				lb.	lb.		
O'Brien, J. ...	1st	Silver bark, black mallee	June	Good ...	Disc ...	3 4	Springtyne cultivated in Oct. and Nov.	Nabawa	2nd week April	35	80	Yes	
Haywood, T. ...	1st	Light silver salmon	June	Good ...	Disc ...	4	Cultivated March. Harrowed April ahead of seeding, also after seeding	Gluyas Early	Last week April	30	83	Yes	
Johns, R. B. ...	1st	Light mallee and silver bark	June	Good ...	Disc ...	3 4	Cultivated ahead of drill	Ford	Last week April	45	90	No	
Morton, N. ...	1st	Silver bark and light mallee	Jan., 1929	Dry ...	Disc ...	3–4	Cross sundercut, Aug. 1929, also ahead of drill	Nabawa	2nd week May	40	80	Yes	
Barry, W. ...	1st	Salmon gum, silver bark	June	Good ...	Disc ...	4	Harrowed Sept. and Oct.	Nabawa	End April ...	44	80	No	
Swan, R. ...	1st	Gimlet, mallee silver bark	July	Good ...	Disc ..	4	Harrowed ahead of drill and after drill	Nabawa	Mid April ...	40	85	Yes	
Guest, A. ...	1st	Silver bark and morrel	June	Good ...	Disc ...	4	Cultivated Sept. Harrowed ahead of drill	Gluyas Early	2nd week May	40	90	Yes	
Flintham, C. ...	1st	Tamma scrub and mixed mallee	May-June	Good ...	Disc ...	4	Cross ploughed July and Aug., twin disc	Gluyas Early	Early May ...	55	83	No	
Thomas Bros. ...	1st	Silver bark and mallee	June	Good ...	Disc ...	4	Cross ploughed Sept., and ahead of drill	Nabawa	1st week April	36	83	No	
Grigg, Bros. ...	1st	Mallee ...	June-July	Good ..	Disc ...	4	Cross ploughed ahead of drill	Late Gluyas	Early May ...	50	112	Yes	Rust.
Prince, E. ...	1st	Whipstick, gimlet and black mallee	June	Good ..	Disc ...	3–4	Springtyne cultivated in Oct. and ahead of drill	Bena	April	38	83	Yes	Trace Flying Smut on foreign wheat
Webster, J. A. ...	1st	Silver bark and light mallee	July	Good ...	Disc ...	3 4	Cross ploughed ahead of seeding	Nabawa	April	48	83	No	Trace Rust

CULTURAL DETAILS—*continued.*

Competitor.	Years cropped.	Timber.	When ploughed.	Condition of land.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Graded.	Disease.
Thomson, A. ...	...	Silver bark and light mallee	...	...	...	in. ...	... ...	Gluyas Early	...	lb. ...	lb. ...	...	Trace Rust
McCosh, J. ...	1st	Dundas blackbutt	June-July	Good ...	Disc ...	3	Springtyne cultivated Oct., also ahead of drill	Nabawa	2nd week April	39	80	Yes	
McCrea, W. F. ...	1st	Gimlet, salmon gum and morrel	June	Good ...	Disc ...	4	Springtyne cultivated ahead of drill	Gluyas Early	2nd week May	45	78	Yes	
Thomas, J. ...	1st	Salmon gum, black mallee and morrell	July	Good ...	Mouldboard	4	Springtyne cultivated Oct.	Gluyas Early	1st week May	30	75	Yes	
Berryman, C. ...	1st	Blackbutt, gimlet and black mallee	July	Good ...	Mouldboard	4	Springtyne cultivated Sept. Harrowed ahead of drill	Ford	3rd week April	30	75	Yes	
Donovan, M. ...	1st	Silver bark and mallee	June-July	Good ...	Disc ...	4	Springtyne cultivated in Oct.	Nabawa	2nd week April	40	85	Yes	
Southern, W. P.	1st	Mallee type	July-Aug.	Good ...	Disc ...	4	Cross ploughed in April, ahead of seeding	Nabawa	2nd week April	45	85	No	Trace Smut and Rust.
Sharp, H. ...	Old land	Light mallee	Sept.	Good ...	Disc ...	4	Cross ploughed in March	Nabawa	3rd week April	48	73	No	Trace Rust.
Lummon, W. ...	Old land	Silver bark, mallee and scrub	June	Good ...	Disc ...	3	Cross ploughed Nov., Springtyne cultivated ahead of seeding	Nabawa	2nd week May	45	90	Yes	Trace Smut.
Sedwick, N. ...	1st	Silver bark and gimlet	Aug.	Good ...	Disc ...	3	Cross ploughed before seeding	Nabawa	2nd week April	40	80	No	Trace Rust.
Richie, D. R. ...	Old land	Silver bark and light mallee	June-July	Good ...	Disc ...	4	Cross ploughed Sept., and again ahead of seeding	Nabawa	1st week May	45	90	No	Smut. Trace Rust.

All competitors treated seed with copper carbonate.

ROYAL AGRICULTURAL SOCIETY—ZONE CHAMPIONSHIP AWARDS.

Representatives from District Agricultural Societies' Competitions and entries received direct by Royal Agricultural Society.

Competitor.	District.	Society.	Variety.	Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
				50 pts.	10 pts.	10 pts.	15 pts.	15 pts.	10 pts.
ZONE 1.—Judge: I. Thomas, Superintendent of Wheat Farms.									
Hebiton, J. K., Sr.	Three Springs	Three Springs	Merredin ...	40	8	8	13	14	83
Forrester, J. K.	Carnamah ...	Royal ...	Nabawa ...	37	8	8	13	14	80
Bothe, B. D. ...	Coorow ...	Royal ...	Bena ...	35	8	8	13	14	78
Rudduck, A. ...	Coorow ...	Royal ...	Nabawa ...	32	9	8	14	14	77
Cumming, A. S.	Carnamah ...	Royal ...	Merredin ...	35	7	8	12	14	76
Durack, P. M....	Arrino ...	Three Springs	Merredin ...	34	8	8	11	13	74
Hilfers & Robertson	Watheroo ...	Royal ...	Waratah ...	32	8	7	13	13	73
Green, J. W. ...	Carnamah ...	Royal ...	Merredin ...	33	7	7	13	13	73
ZONE 2.—Judge: F. L. Shier, Agricultural Adviser.									
Moore, T. ...	Indarra ...	Royal ...	Merredin ...	30	9	9	13	14	75
Porter, F. A. ...	Ajana ...	Royal ...	Geeralying ...	22	9	9	13	14	67
ZONE 3.—Judge: R. P. Roberts, Agricultural Adviser.									
Woodfield, N. ...	Goomalling ...	Royal ...	Gluclub ...	35	8	8	13	12	76
Jones, W. W.	Cowcowing ...	Royal ...	Nabawa ...	30	9	9	13	14	75
ZONE 4.—Judge: R. P. Roberts, Agricultural Adviser.									
Landsell, G. ...	Mukinbudin ...	Nungarin ...	Gluyas Early	31	8	9	13	14	75
Creagh Bros. ...	Kwelkan ...	Nungarin ...	Gluyas Early	30	9	7	14	13	73
Hopwood, B. W. G.	Bencubbin ...	Mt. Marshall	Bencubbin ...	28	9	9	13	13	72
Thomson, M. ...	N. Bencubbin	Mt. Marshall	Nabawa ...	24	8	9	12	14	67
ZONE 5.—Judge: G. L. Throssell, Agricultural Adviser.									
Cook, W. T. ...	S. Walgoolan	Merredin ...	Merredin ...	35	9	8	13	13	78
Smith, C. & Sons	Yarding ...	Bruce Rock	Gluclub ...	32	9	9	13	14	77
Allen Bros. ...	Central Kumminin	Bruce Rock	Gluclub ...	31	9	9	12	14	75
Lambert, J. B....	Koonadgin ...	Merredin ...	Cluclub ...	32	9	8	12	13	74
Prowse Bros. ...	Doodlakine ...	Doodlakine-Baandee	Gluyas Early	30	8	7	14	13	72
Prowse, A. E. C.	Doodlakine ...	Doodlakine-Baandee	Gluyas Early	25	7	8	14	12	66
ZONE 7.—Judge: G. L. Throssell, Agricultural Adviser.									
Freebairn, F. S.	Jilakin ...	Kulin ...	Gluclub ...	31	9	8	13	13	74
Collinson & Fleay	Burngup ...	Lake Grace...	Gluclub ...	29	9	8	13	14	73
Forsyth, Mrs. E.	Jitarning ...	Kulin ...	Waratah ...	28	9	8	14	13	71
Ray, J. G. ...	N. Karlgarin	Karlgarin ...	Gluyas Early	24	9	9	13	14	69
Grant, L. J. ...	Karlgarin ...	Karlgarin ...	Nabawa ...	21	8	8	13	13	63
Bishop, S. H. ...	Lake Grace ...	Lake Grace...	Waratah ...	19	7	7	13	12	60
ZONE 8.—Judge: A. S. Wild, Agricultural Adviser.									
Beeck, H. O. ...	Gnowangerup	Gnowangerup	Yandilla King	42	9	8	13	14	86
Cockram, C. E....	Pallinup ...	Gnowangerup	Yandilla King	40	8	9	14	14	85
Murray, W. G. ...	Borden ...	Royal ...	Yandilla King	39	9	9	13	14	84
Lohoar, J. P. & Sons	S. Quairading	Royal ...	Gluclub ...	36	9	8	13	13	79
Richards, A. ...	S. Caroling ...	Royal ...	Nabawa ...	34	9	8	14	13	78
Wellard & Wellard	Gnowangerup	Royal ...	Nabawa ...	35	8	9	13	13	78
Murray, A. ...	Tinkurrin ...	Wickepin ...	Canberra ...	33	9	7	14	13	76
Hosken Bros. ...	Dorakin ...	Wickepin ...	Gallipoli ...	31	9	9	13	13	75
Taylor, H. E. & Sons	Quairading ...	Royal ...	Gluclub ...	33	8	8	13	13	75
Slee, E. J. W. ...	Boongadoo ...	Nyabing ...	Major ...	25	8	8	13	13	67
Charlsley, H. J.	Nyabing ...	Nyabing ...	Nabawa ...	24	7	8	13	13	65
ZONE 9.—Judge: L. G. Senior, Manager, Experiment Farm, Salmon Gums.									
O'Brien, J. ...	Kumarl ...	S. Mallee ...	Nabawa ...	34	9	9	12	13	77
Haywood, T. ...	E. Dowak ...	S. Mallee ...	Gluyas Early	28	9	9	14	14	74

OBJECTS OF THE COMPETITION.

The object of the competitions is the improvement of the standard of wheat farming methods practised throughout the Wheat Belt. A spirit of healthy rivalry is engendered, and competitors and others set themselves to follow those more successful than themselves. The methods practised by all the competitors are tabu-

lated, the good farmers of the State receive recognition of their ability, and consequently a standard of practical wheat farming is established. It is demonstrated that where recommended methods are employed, reasonable success follows. The competitions also afford the officers of the Department of Agriculture opportunities to come into personal contact with the farmers.

THE SEASON.

The 1931 season was favourable for weed growth and disease development, and demonstrated the necessity for arranging farming operations to control such conditions.

Owing to the scanty rainfall during the autumn months, difficulty was experienced in preparing a desired seed bed and destroying weed growth prior to planting. The result was that much crop was planted on fallow which was dry and contained weed seeds.

Heavy rains fell during the first fortnight in May. These, however, were followed by a dry period which lasted to the end of the first week in June. This caused anxiety regarding the germination. However, though late, the crops came away fairly well after the June rains.

Heavy successive frosts during June and July retarded crop growth, but quicker growth was made with the warmer conditions from the latter end of August. With the advent of warmer weather, also, diseases appeared. Of these, Take-all was the most prevalent. The winter rains, in most districts, were slightly below the average.

Towards the end of the growing season the seasonal rains in the Eastern districts terminated early and abruptly.

ENTRIES.

The total number of crops competing for the Zone Championship Awards in the different zones was 110.

Entries were received from 13 district Agricultural Societies, and 15 entries were received direct by the Royal Agricultural Society. In addition, local competitions were conducted by the Dalwallinu, Kukerin, Bruce Rock, and Phillips River Agricultural Societies, and also by the Karloning Primary Producers' Association. These local competitions included 39 competitors, making a total of 149 crops inspected in all.

The following table shows the progress of the competition since its inception in 1921:—

Year.	No. of District Agricultural Societies competing.	No. of Competitors.	Average Yield of Competitors.	Average Yield for State.
			bush.	bush.
1921	...	15	25	10·4
1922	...	32	24	8·9
1923	12	82	29	11·4
1924	15	70	31	12·8
1925	13	59	22·5	9·7
1926	11	99	24·5	12·0
1927	10	100	26·9	12·1
1928	13	114	22·5	10·1
1929	12	156	21·7	11·0
1930	15	165	27·4	13·3
1931	13	110	27·4	*11·6

* Estimate. District Agricultural Societies did not participate until 1923.

VARIETIES.

The standard midseason maturing variety, Nabawa, was planted by 31 of the 110 competitors. Fifteen planted the standard early variety, Gluyas Early, and thirteen the standard late variety, Yandilla King. The varieties, Gluclub and Merredin, were planted by 13 and 12 competitors respectively; Waratah, Gallipoli, and Bena each by three; Major, Hard Federation, Carrabin, Geeralying, and Ford by two, and Canberra, Rajah, Beneubbin, S.H.J., Gluyas Late, Noongaar, and Federation by one.

Three zone championships were won with the variety Merredin; two with Gluclub; and one each with the varieties Gluyas Early, Nabawa, and Yandilla King respectively.

TIME OF SEEDING.

This is one of the most important factors for the successful production of the wheat crop. The seeding season is a comparatively short one, and as it is known that some varieties are more suitable for early planting, others for midseason and others for late planting, the seeding operations should be so arranged that the varieties selected are planted as near as possible to their optimum, *i.e.*, best seeding period.

Sixty-eight per cent. of the crops was planted during the month of May, and 25 per cent. during April.

The late sown crops were located chiefly in the heavier rainfall districts where the seeding period is later.

Of the 110 crops in the competition, 13 were late maturing wheats, 63 midseason, and 34 early. It has been demonstrated by experiments at the experiment farms that when it is necessary, owing to the area sown, to extend the seeding period outside the month of May, it is better to plant suitable varieties in April rather than to extend the planting period into June.

RATES OF SEEDING.

The rates of seeding varied from 30 lbs. to 64 lbs. per acre. The average rate was 47 lbs. per acre. The majority of the competitors planted from 45-60 lbs. per acre.

Experimental results indicated that for the midseason and early districts, while the yield is not decreased by heavier rates of seeding, no advantage is gained by increasing the amount over 45 lbs.. per acre. In the very early districts, however, the lighter rates of seeding are more suitable. For the late, *i.e.*, heavy rainfall districts, heavier rates can be practised with no disadvantage, particularly when trouble from weed growth is anticipated.

RATES OF SUPERPHOSPHATE.

Superphosphate was applied by every competitor, the average rate of application being 85.2 lbs., a decrease of 12 lbs. upon the previous year's average. The lightest and heaviest applications were 45 lbs. and 150 lbs. respectively, while the majority of the competitors used rates ranging between 80 lbs. and 100 lbs. per acre. The rate of superphosphate has been gradually increasing in most districts. This has been partly due, no doubt, to the fact that the leading competitors have taken advantage of the results of the experiments at the various experiment farms and have obtained profitable results by applying the heavier dressings of superphosphate.

YIELDS.

Since 1925 the Royal Agricultural Society has awarded a special prize of £5 5s. to the competitor who obtains the highest calculated bushel yield per acre from the competing area of 50 acres. The award this year has been made to Mr. H. O. Beeck, of Gnowangerup, whose competing area of the variety "Yandilla

King," yielded 42 bushels per acre. This yield is four bushels less than the State record established in 1929 by Mr. C. E. Cockram, of Pallinup, with the variety "Yandilla King," which yielded 46 bushels per acre. The winners of this prize to date are as follow:—

1925—Hebiton & Sons, Three Springs	Nabawa	34	bush. per acre.
1926—Cuming, Bros., Carnamah ...	Yandilla King ...	38	" "
1927—A. W. Parkinson, Gnowangerup	Yandilla King ...	40	" "
1928—A. W. Parkinson, Gnowangerup	Yandilla King ...	40	" "
1929—C. E. Cockram, Pallinup ...	Yandilla King ...	46	" "
1930—C. Smith & Sons, Yarding ...	Gluclub	43	" "
1931—H. O. Beeck, Gnowangerup ...	Yandilla King ...	42	" "

This year 71 crops were calculated to yield 25 bushels or over per acre. Forty competitors obtained yields of 30 bushels and over, and 17 yields of 35 bushels and over. Those competitors obtaining 30 bushels or over per acre are tabulated below:—

Zone.	Competitor.	District.	Society.	Variety.	Calculated Yield per Acre.
8	Beeck, H. O. ...	Gnowangerup	Gnowangerup...	Yandilla King	42
8	Cochram, C. E. ...	Pallinup ...	Gnowangerup...	Yandilla King	40
1	Hebiton, J. K., senr.	Three Springs	Three Springs...	Merredin ...	40
8	Murray, W. G. ...	Borden ...	Royal	Yandilla King	39
8	Formby, R. & Co., Ltd.	Gnowangerup	Gnowangerup...	Yandilla King	38
8	Tymms, H. O. ...	Gnowangerup	Gnowangerup...	Yandilla King	38
8	Ball, J. L. ...	Gnowangerup	Gnowangerup...	Bena	37
1	Forrester, J. K. ...	Carnamah ...	Royal	Nabawa ...	37
8	Lohoar, J. P. & Sons	South Quairading	Royal	Gluclub ...	36
8	McDonald, J. ...	Gnowangerup	Gnowangerup...	Yandilla King	36
1	Bothe, B. D. ...	Coorow ...	Royal	Bena	35
5	Cook, W. T. ...	South Walgoolan	Merredin ...	Merredin ...	35
1	Cumming, A. S. ...	Carnamah ...	Royal	Merredin ...	35
8	Schneider Bros. ...	Gnowangerup	Gnowangerup...	Nabawa ...	35
8	Stewart, W. B. ...	Gnowangerup	Gnowangerup...	Yandilla King	35
8	Wellard & Wellard	Gnowangerup	Royal	Nabawa ...	35
3	Woodfield	Goomalling...	Royal	Gluclub ...	35
1	Durack, P. M. ...	Arrino ...	Three Springs	Merredin ...	34
9	O'Brien, J. ...	Kumarl ...	Southern Mallee	Nabawa ...	34
8	Richards, A. ...	S. Caroling...	Royal	Nabawa ...	34
8	White, R. H. ...	Pallinup ...	Gnowangerup...	Yandilla King	34
1	Green, J. W. ...	Carnamah ...	Royal	Merredin ...	33
8	Murray, A. ...	Tinkurrin ...	Wickepin ...	Canberra ...	33
8	Taylor, H. E. & Sons	Quairading	Wickepin ...	Gluclub ...	33
1	Hilfers & Robertson	Watheroo ...	Royal	Waratah ...	32
5	Lambert, J. B. ...	Koonadgin ...	Merredin ...	Gluclub ...	32
1	Rudduck, A. ...	Coorow ...	Royal	Nabawa ...	32
5	Smith, C. & Sons...	Yarding ...	Bruce Rock ...	Gluclub ...	32
1	Thomas, C. E. ...	Three Springs	Three Springs	Federation ...	32
5	Allen Bros. ...	Central Kumminin	Bruce Rock ...	Gluclub ...	31
7	Freebairn, F. S. ...	Jilakin ...	Kulin	Gluclub ...	31
8	Garnett, J. ...	Gnowangerup	Gnowangerup...	Yandilla King	31
8	Hoskin Bros. ...	Dorakin ...	Wickepin ...	Gallipoli ...	31
4	Landsell, G. ...	Mukinbudin	Nungarin ...	Gluyas Early...	31
5	Smallacombe, ...	Nangeenan ...	Merredin ...	Carrabin ...	31
4	Creagh Bros. ...	Kwelkan ...	Nungarin ...	Gluyas Early...	30
3	Jones, W. W. ...	Cowcowing ...	Royal	Nabawa ...	30
1	McKenzie, N. ...	Three Springs	Three Springs...	Merredin ...	30
2	Moore, T.	Indarra ...	Royal	Merredin ...	30
5	Prowse Bros. ...	Doodlakine...	Doodlakine-Baandee	Gluyas Early...	30

The average calculated yield for all crops inspected was 27.4 bushels per acre, equalling the average for the previous year. This yield has been exceeded on two previous occasions, 1923 and 1924, when the averages were 29 and 31 bushels per acre respectively.

The following table shows the comparison between the yields for the 1930-31 season, and the previous four years:—

Zone.	No. of Competitors 1931.	Average Calculated Yields.				
		1931.	1930.	1929.	1928.	1927.
1 ...	11	33·5	28·2	24·7	29·0	28·0
2 ...	2	26·0	27·6	22·5	19·3	22·4
3 ...	2	32·5	27·5	23·4	21·3	25·6
4 ...	12	25·2	26·1	18·2	18·3	29·2
5 ...	14	28·0	32·7	21·9	20·4	26·2
7 ...	17	21·8	28·6	22·0	23·0	25·6
8 ...	29	31·9	30·0	32·2	31·0	32·0
9 ...	23	23·3	19·8	14·5	...	...
	110	27·4	27·4	20·7*	22·5	26·9

* The results for 1929 included a number of local competitions planted on fallowed land. There were 156 competitors in the Royal and District Competitions that year—the average being 21·7 bus. per acre.

It is to be hoped that the efforts of those who carefully prepared their land, and who harvested good returns therefrom, will stimulate others to do likewise. It must be remembered, however, that the test of efficient farming comes when our season is least favourable. It is then that sound methods prove their value.

FALLOWING.

The conditions of the competition required the crops to be sown on fallowed land. In the preparation of the fallows most of the competitors ploughed their land during the winter months of June to August. It has been definitely demonstrated that higher yields are obtained if the land is ploughed early in the fallowing season than when ploughed later. In this connection in an experiment conducted at the Merredin Experiment Farm for six years (1924-1929), the average yield of plots ploughed the first week in June was 3 bushels 51 lbs. more than those ploughed the last week in August.

The average depth of the initial ploughing was from three to four inches, mouldboard and disc ploughs being used for this operation, while in a few cases rigidtyne scarifiers and springtyne cultivators were utilised for the initial cultural operation. The advantages of using a particular type of implement is determined by the type and condition of the soil to be dealt with. Whether the disc or mouldboard is selected, it is essential that the work be done thoroughly.

For the subsequent working of the fallow in preparation of a seedbed, the springtyne cultivator was the implement chiefly used. A disc implement was favoured, however, when the ground was hard or weedy. The rigidtyne cultivator is also designed and is suitable for this purpose.

Sheep are becoming more numerous throughout the Wheat Belt each year, and their value in assisting to control weed growth on fallows is more widely appreciated.

Experiments at the various experiment farms have shown that increased yields were obtained when heavier dressings of superphosphate up to 150 lbs. were used, particularly on the lighter classes of soil.

The drastic change in the economic conditions of wheat farming, however, alters the interpretation of the results of these experiments because, where in the past more liberal dressings of superphosphate were profitable, this is not so to-day.

An analysis of the results of the rate of superphosphate with wheat experiments shows that when superphosphate is valued at £5 a ton and wheat at 2s. a bushel, the limit of profitable application for the heavy forest country appears to be reached with an application of 112 lbs. per acre, and on the light land 120 lbs. per acre.

DISEASES.

Diseases found in the competition crops were Ball, Flag and Loose Smuts, Take-all and similar diseases (Foot Rot and Root Rot) and Septoria and Rust. Frost and wind injury were also observed.

Ball Smut.—Although not greatly in evidence, it is surprising to find this disease in competition crops. Though the number of infected crops is yearly diminishing the economic loss to farmers from this and other preventable diseases is all too large. This disease can be prevented by the use of such fungicides as dry copper carbonate powder or the blustone or formalin solutions. All are reliable fungicides, but of these by far the most popular is the dry copper carbonate dust. When correctly applied, at the rate of 1½ to 2 ounces per bushel, this method is very effective in preventing the disease. An added advantage with this method is that the seed wheat can be treated and stored immediately after harvest without any detrimental effect, and in addition the copper carbonate acts as a preventative against vermin. The presence of Ball Smut in a crop nowadays is not only indicative of faulty treatment, but also of "slipshod" methods. The results with this treatment have been so highly satisfactory that, where care is exercised and the seed thoroughly dusted, the disease can be entirely eliminated.

Flag Smut.—This disease is becoming more in evidence each year. This is probably due to the fact that a considerable number of farmers fail to recognise the disease when present in their crops. Consequently serious damage is caused before control steps are taken.

A wheat plant affected by Flag Smut has the leaves and leaf sheaths curled, twisted and distorted. Together with the stems, they develop long black streaks running paralel with the veins. The streaks are due to ruptures or slits caused by the fungus, and from these comes the black powder or smut from whicch the disease derives its name. The affected parts may become quite blackened, and the smut may even penetrate the hollow centres of the straw. Affected plants are either killed or stunted, and at close view show out quite distinctly among the taller healthy plants. Whole stools may be smutted or only some of the shoots, the remainder forming normal, but undersized, ears with little or no grain.

Unlike Ball Smut, where the chief source of infection is from spores on the seed, this disease is a soil infection. Spores from various agencies find their way into the soil, and remain there to attack the wheat crops. It can be seen, therefore, that its control lies not so much from seed treatment, but more along the lines of crop rotation. As a precaution all seed should be treated with dry copper carbonate, and while there is evidence that this diminishes re-infection to a limited extent, it will not control it. The most effective means of control of this disease are by by cultural methods in conjunction with the growing of resistant wheats, and it is indeed fortunate that such a popular variety as Nabawa is Flag Smut resistant, as are also the late maturing varieties Yandilla King and Sutton. Other resistant wheats are Beneubbin, Carrabin, Geeralying, and Totadgin, all of which are recommended for planting on infected areas. Gluyas Early, Merredin, and Canberra, all early varieties, are very susceptible to this disease.

A certain means of spreading infection throughout the farm is by feeding infected wheaten hay to stock. Oaten hay should be used, as in addition the growing of oats also assists in the control of the disease Take-all. Badly infested wheat stubbles may be burnt and so prevent stock spreading the spores over the farm, either through the agencies of the manure or by carrying it on their bodies. Early fallow and judicious cultviation to keep down weeds and self sown wheat plants are essential. Where it is known that a paddock is infected, it is advisable to delay seeding until after the first seeding rains.

Briefly, the methods of control are as follow:—

1. Fallow early and well.
2. Keep fallows free of weeds and self-sown wheat.
3. Plant resistant varieties.
4. Plant as late as is safe to plant in the sowing season.
5. Discontinue feeding infected hay to stock.
6. Include oats in the crop rotation.
7. Burn the stubble of badly infected crops.

Loose Smut.—Loose Smut or Flying Smut is more difficult to control, as there is no practical method of seed treatment. Seed from badly infected crops should be discarded, and fresh seed obtained from clean crops.

Take-all was very much in evidence this year. This disease is also the result of soil infection, and its control is very similar to that for Flag Smut. There is, however, no variety, as yet, known to be resistant to this disease, and its control depends, therefore, on the farming practice adopted. In this respect the value of a crop of oats (free of barley or wheat) is of utmost importance.

It was not surprising to find that in some cases where competing crops were badly infested with Take-all, the reason was because no control methods had been taken. *Farmers are advised not to wait until their cropping areas become badly infected before taking steps to control these diseases, but to adopt preventative methods which include the growing of oats in their cropping rotation.*

Rust.—This is a disease, the prevalence of which depends mainly on the seasonal conditions, over which there is no control. In districts where rust is likely to occur, farmers should avoid growing rust-liable wheats.

Septoria.—The disease Septoria is most liable to occur when the wheat crop is planted too early. Under these conditions there is a tendency for the plants to make flaggy and rank growth, and as a result they become more susceptible to infection by the fungus. The control consists of seasonable planting and the practice of clean farming methods.

It is not possible, in the space of this article, to discuss the various diseases fully, but should any reader desire further information concerning these diseases, bulletins are available for free distribution, and can be obtained on application. The bulletins mentioned are:—

Septoria—No. 121.
Rust of Cereals—No. 126.
Flag Smut—No. 134.
Cereal Smuts—No. 160.
Foot Rot and Root-Rot of Wheat—No. 228.
Partial Rot and Root-Rot of Wheat—No. 228.
Partial or complete emptiness in wheat heads—No. 301.
Earcockle and Bacterial Diseases of Wheat—No. 196.

The 50-acre Crop Competitions have proved invaluable for demonstrating the correctness of methods under varying conditions of soil and climate. When sound methods of farming are adopted, higher yields are made possible and, under correct business management, the cost of production lowered.

FIELD EXPERIMENTS WITH WHEAT, 1931.

YILGARN EXPERIMENT FARM.

I. THOMAS, Superintendent of Wheat Farms; R. W. PRUNSTER, Farm Manager.

The monthly rainfalls, as recorded at the farm during 1931, together with the averages for the past four years, are set out hereunder:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sep.	Oct.	Total.			
1931	3	19	8	97	235	131	106	180	83	19	804	80	8	1,019
Average, 4 yrs.	33	77	45	89	204	145	104	101	46	24	624	96	60	1,024

The beginning of the season was marked by the absence of early autumn rains. Very heavy rains fell during the first fortnight in May, but these were followed by a dry period lasting to the end of the first week in June. As a result of the long, dry spell, a crust was formed on the soil surface, and anxiety was felt concerning the young plants breaking through. However though late, the crops came away fairly well after the June rains. Heavy successive frost in June and July were not conducive to quick growth, but good growth was made when the warmer weather set in towards the end of August. Towards the end of the season the seasonal rains terminated early and abruptly. This adversely affected the yield.

The land on which the experiments were conducted was orignially timbered with salmon gum and gimlet. During June and July, 1930, it was disc ploughed to a depth of three to four inches. This was followed by a springtyne cultivation during August and September, and again after rain in December. During March the land was disc cultivated, and again where required after the heavy rain in May. This was followed by the springtyne cultivator immediately prior to planting.

TIME OF SEEDING EXPERIMENT.

The object of this experiment is to determine the most suitable month to plant the wheat crop.

To meet the requirements of the experiment two varieties of different maturity were used—Nabawa, representing the midseason, and Gluyas Early, the early maturing varieties.

The Nabawa plots were planted in mid-April, May, and June respectively, and the Gluyas Early plots were planted in mid-May, June, and July. Each plot was repeated five times.

All plots germinated well, although the May plantings were a little late in getting away. Late rains in October and early November favoured the June and July sown plots.

TIME OF SEEDING EXPERIMENT.

Variety—Nabawa. Superphosphate—90–100lb. per acre. Seed—30lb. per acre.

Planted.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per acre, 1928–31.	Percentage Yields, 1928–31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
April 15th	*	16 48	18 32	20 16	18 32	18 32	103	18 35	108
May 18th	*	17 12	17 36	19 4	18 0	17 58	100	17 8	100
June 17th	*	12 56	12 48	11 44	12 48	12 34	70	9 24	55

* Section 1 discarded owing to error in drilling.

TIME OF SEEDING EXPERIMENT.

Variety—Gluyas Early. Superphosphate—90–100lb. per acre. Seed—30lb. per acre.

Planted.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per acre, 1928–31.	Percentage Yields, 1928–31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
June 17th	14 24	14 0	12 40	14 16	13 44	13 49	84	11 37	70
May 18th	15 12	17 28	15 36	17 4	17 4	16 29	100	16 41	100
July 15th	6 16	8 16	6 48	7 12	6 32	7 1	43	4 52	29

The results this year, and the average results over the four years the experiment has been conducted, show that it is of advantage to plant the mid-season variety, Nabawa, during April rather than in May. By delaying planting until June, however, unprofitable returns can be expected.

Both this year's returns and those of the four years' average show also that early maturing varieties are more prolific when sown in May, and that the yields decrease considerably and are unprofitable should planting be delayed after this month.

RATE OF SEEDING EXPERIMENT.

The object of this experiment is to determine the most economic rate of seeding with—(a) a midseason free-stooling, and (b) an early and sparse-stooling variety.

For the former the variety Nabawa was used, and for the latter the variety Noongaar.

RATE OF SEEDING EXPERIMENT.

Planted on 8th May, 1931. Variety—Nabawa. Superphosphate—90–100lb. per acre.

Rate of Seed per acre.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per acre, 1928–31.	Percentage Yields, 1928–31.
	Sec. 1.	Sec. 1.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
20lb.	17 20	19 44	17 52	18 40	17 4	18 8	95	17 31	99
40lb.	19 4	20 56	19 12	17 52	17 52	18 59	100	17 41	100
30lb.	19 12	21 12	19 52	17 28	17 44	19 6	101	17 15	98

RATE OF SEEDING EXPERIMENT.

Planted on 19th May 1931. Variety—Noongaar. Superphosphate—90–100lb. per acre.

Rate of Seed per acre.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per acre, 1928–31.	Percentage Yields, 1928–31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
20lb.	13 20	12 32	14 24	14 32	15 4	13 58	81	14 20	96
40lb.	14 16	18 8	17 36	16 48	19 12	17 12	100	14 58	100
30lb.	15 44	16 32	17 4	17 36	17 52	16 58	99	14 54	100

The average results with the early and sparse-stooling varieties for the four years the experiment has been conducted show but little variation with the different rates of sowing. This year, however, the lower rate of seeding at 20 lbs. per acre is shown at a disadvantage.

With the free-stooling variety the average results of the four years are very similar. The results for this year in this section show the 20 lbs. rate of seeding at a slight disadvantage.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

The object of this experiment is to determine the most economical rate to apply superphosphate to the wheat crop.

This experiment is divided into three sections, in each of which plots treated with 150 lbs. of superphosphate per acre were regarded as controls. Thus, in Section 1, the rates of 300 and 225 lbs. per acre were compared with the control rate of 150 lbs. per acre, and in Section 2 the rates of no application and 75 lbs. per acre were compared with the control rate of 150 lbs.

During the growing season it was noticed that maturity was hastened in the plots treated with the heavier dressings of superphosphate. The plots to which no superphosphate had been applied were still comparatively green when the others had matured. The no superphosphate plots also suffered considerably from "tipping," neither had the plants stooled as well.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT NO 2.

Planted on 16th May, 1931. Variety—Gluyas Early. Seed—30lb. per acre.

Rate of Application of Superphosphate per acre.	Computed Yield per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per acre, 1929-31.	Percentage Yields, 1929-31.
	Sec. 1.	Sec. 1.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
300lb.	14 40	19 44	20 40	20 16	18 24	18 25	105	15 7	98
150lb.	15 12	18 56	19 12	18 0	18 8	17 54	100	15 31	100
225lb.	17 44	19 28	19 20	16 24	22 8	19 1	106	15 13	98

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT NO. 1.

Planted on 16th May, 1931. Variety—Gluyas Early. Seed—30lb. per acre.

Rate of Application of Superphosphate per acre.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per acre, 1929-31.	Percentage Yields, 1929-31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
Nil	10 40	11 12	11 36	10 24	7 28	10 16	60	10 17	60
150lb.	16 8	18 24	18 40	16 56	15 28	17 7	100	16 59	100
75lb.	16 16	17 52	17 20	13 52	14 0	15 52	93	14 45	87

The average results show that increased yields are obtained when superphosphate is applied up to 150 lbs. per acre.

Under the present economic conditions the most economical rate of application appears to be between 100 and 112 lbs. per acre.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

The object of this experiment is to determine whether, when heavy dressings of superphosphate are applied, it would be profitable to apply part or whole of the amount when cultivating the fallowed land during the late summer and early autumn.

For the purpose of the experiment three plots were required, and the various rates and times of application of the superphosphate are shown in the accompanying table of results.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

Planted on 17th May, 1931. Variety—Gluyas Early. Seed—30lb. per acre.

Time of Application of Superphosphate.	Computed Yield per acre.					Average Yields per acre. 1931.	Percentage Yields, 1931.	Average Yields per acre, 1928–31.	Percentage Yields, 1928–31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
75lbs. in April; 150lbs. at Seeding	21 36	19 28	21 4	20 40	19 4	20 22	108	17 56	109
225lbs. in April ...	19 4	17 44	20 8	18 16	18 56	18 50	100	16 28	100
150lbs. in April; 75lbs. at Seeding	18 24	18 56	19 12	18 16	18 24	18 39	99	16 51	102

The results for last year, and also the average for the four years, confirm the previous conclusion, viz., the yields can be expected to be greater when the greater proportion of superphosphate is applied at seeding time.

SEASONAL PLANTING EXPERIMENT.

The objects of this experiment are:—

1. To ascertain the most suitable month to plant the midseason, early, and very early maturing varieties of wheat.
2. To determine the most prolific of each of the above types.

To meet the requirements of the experiment three sections were needed, viz.:—

(a) Section 1, planted in April, representing early planting.

(b) Section 2, planted in May, representing midseason planting.

(c) Section 3, planted in June, representing late planting.

Each section, planted in its respective month, was repeated five times, all plots being eventually harvested for grain.

April Planting.

At the time of planting the soil was in good condition and each variety germinated, stooled, and grew well. They were retarded in July by heavy frosts, but made strong growth during the later months.

The very early maturing variety, Noongaar, came into ear early in August, and was very badly injured by frost. The growth of the early varieties was affected but little by the frosts.

SEASONAL PLANTING EXPERIMENT.

April Planting.

Planted on April 16th, 1931. Superphosphate—90–100lb. per acre. Seed—30lb. per acre.

Variety.	Maturity.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Percentage Yields, 1928–31.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	%
Nabawa ...	Midseason ...	20 16	21 4	22 56	22 0	19 44	21 12	100	100*
Bencubbin ...	Midseason ...	24 32	26 48	29 4	28 0	27 36	27 12	128	130*
Gluyas Early ...	Early ...	17 44	20 56	21 12	23 44	21 20	20 59	95	90
Nabawa ...	Midseason ...	20 16	21 52	21 4	24 24	22 48	22 5	100	100
Noongaar ...	Very Early	5 4	5 52	6 48	7 36	9 20	6 56	31	62

* 1930–31.

These results show that it is inadvisable to plant a very early variety during April when required for grain.

Very outstanding results were obtained from the new midseason variety, Bencubbin, for the two years it has been included in the trials.

May Planting.

At the time of planting the land was hard in some patches and boggy in others. Owing to the dry spell from mid May to 8th June, the germination was not quite so good as that in the April plots. Shortly after germination growth was retarded by very cold weather, but warmer conditions in August encouraged strong growth.

Late rains during November favoured the midseason varieties.

SEASONAL PLANTING EXPERIMENT.

May Planting.

Planted on 20th May, 1931. Superphosphate—90–100lb. per acre. Seed—30lb. per acre.

Variety.	Maturity.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Percentage Yields, 1928–31.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	%
Nabawa ...	Midseason ...	17 4	17 36	15 4	15 12	14 48	15 57	100	100
Bencubbin	Midseason ...	19 28	21 20	19 44	22 24	17 4	20 0	125	115*
Carrabin ...	Early ...	16 56	18 32	16 8	18 16	14 40	16 54	99	98
Nabawa ...	Midseason ...	17 28	18 0	17 4	18 24	14 24	17 4	100	100
S.H.J.	Early ...	18 8	16 8	16 0	16 48	15 4	16 26	96	90
Gluyas Early ...	Early ...	20 56	17 4	20 0	18 24	17 4	18 42	112	108
Nabawa ...	Midseason ...	19 44	16 8	17 4	16 32	14 8	16 43	100	100
Merredin ...	Early ...	21 44	17 52	19 12	17 20	16 16	18 29	111	95
Geeralying ...	Very Early	22 8	15 44	17 44	22 0	21 44	19 52	113	104
Nabawa ...	Midseason ...	20 16	17 4	17 20	17 4	16 24	17 38	100	100
Noongaar ...	Very Early	18 56	16 8	19 4	20 16	18 40	18 37	105	111

*1930–31.

In this section, also, the variety Bencubbin shows to the greatest advantage.

The early varieties also show to advantage compared with the control midseason variety, and the results indicate, in view of the unusual rains which fell in November and which favoured the midseason varieties, that they are the most suitable for May planting in the Yilgarn district.

June Planting.

Germination was good, and all varieties benefited by the late November rains. As a result of this, better growth was noted in this section than has been the case in previous years.

SEASONAL PLANTING EXPERIMENT.

June Planting.

Planted on 17th June, 1931. Superphosphate—90-100lb. per acre. Seed—30lb. per acre.

Variety.	Maturity.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Percentage Yields, 1928-31
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	%
Nabawa ...	Midseason ...	14 40	13 4	13 36	12 40	9 44	12 45	100	100
Bencubbin ...	Midseason ...	17 28	14 56	15 28	13 28	12 24	14 45	116	122*
Carrabin ...	Early ...	15 12	13 44	13 28	12 0	10 56	13 4	99	107*
Nabawa ...	Midseason ...	15 12	14 16	13 36	11 52	11 4	13 12	100	100
S.H.J. ...	Early ...	12 32	12 16	11 4	9 52	9 4	10 58	83	89
Gluyas Early ...	Early ...	16 8	16 56	13 52	13 44	10 56	14 19	112	115
Nabawa ...	Midseason ...	13 52	14 40	12 24	12 32	10 32	12 48	100	100
Merredin ...	Early ...	14 0	14 24	12 48	13 4	9 36	12 46	100	99
Geeralying ...	Very Early	14 48	13 52	11 52	12 8	11 20	12 48	96	103
Nabawa ...	Midseason ...	15 44	15 4	12 8	12 8	11 52	13 23	100	100
Noongaar ...	Very Early	19 4	17 20	15 44	14 56	12 24	15 54	119	130

* 1930-31.

Both this and previous years' results demonstrate the suitability of Noongaar when late planting is found necessary.

NITROGEN EXPERIMENT.

The object of this experiment is to determine whether increased yields are obtained when heavy dressings of sulphate of ammonia are applied to the wheat crop in addition to an application of superphosphate.

For the purpose of the experiment two rates of sulphate of ammonia were applied, viz., 1 cwt. and 2 cwt. respectively, while a third plot, which received no sulphate of ammonia, was used as a control plot. Superphosphate was applied at the rate of 112 lbs. per acre to all plots, which were repeated five times. The experiment was conducted on both fallowed and unfallowed land.

The fallowed section was ploughed with a disc implement during June, 1930, springtyne cultivated in August-September of that year, and again in December after a heavy thunderstorm. It was disc cultivated during March, and again before seeding.

It was then again springtyne cultivated prior to planting.

The unfallowed section was ploughed with a disc cultivating plough immediately prior to seeding. The land was a little wet when ploughed, but a springtyne cultivation brought it into good seeding condition.

The results obtained are tabulated hereunder:—

NITROGEN EXPERIMENT.

Fallow Section.

Planted on 18th and 19th May, 1931. Superphosphate—90-100lb. per acre. Variety—Gluyas Early.
Seed—30lb. per acre.

Rate of Application of Superphosphate of Ammonia per acre.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Percentage Yields, 1929-31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	%
1 cwt.	15 36	13 52	14 24	17 36	20 48	16 27	108	106
Nil	13 20	14 24	13 28	17 36	17 20	15 13	100	100
2 cwt.	14 16	13 12	16 24	20 16	19 44	16 46	110	106

NITROGEN EXPERIMENT.

Non-Fallow Section.

Planted on 18th and 19th May, 1931. Superphosphate—90-100lb. per acre. Variety—Gluyas Early. Seed—30lb. per acre.

Rate of Application of Sulphate of Ammonia per acre.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per acre, 1930-31.	Percentage Yields, 1930-31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
1 cwt.	6 8	8 40	8 32	9 36	8 0	8 11	97	10 26	97
Nil	7 44	8 32	8 32	8 8	9 4	8 24	100	10 43	100
2 cwt.	8 56	8 48	10 48	9 12	9 28	9 26	112	10 38	99

The results obtained from the fallowed section confirm those of previous years, viz., the yields are increased by the application of sulphate of ammonia, but not in sufficiency to be economical.

This year the results of the unfallowed section show that increased yields were obtained when 224 lbs. per acre of sulphate of ammonia were applied. The average results for the two years, however, indicate that no benefit is derived from the application of the nitrogenous fertiliser. This is probably due to the fact that with unfallowed land other factors, such as that of moisture, limit the growth of the wheat crop.

MANGANESE EXPERIMENT.

This experiment was conducted to determine whether any increase in yield would result when a manganese fertiliser was applied to the wheat crop.

Manganese sulphate was applied at planting time to separate plots at two rates, viz., 26 lbs. and 52 lbs. per acre. The addition of 90-100 lbs. per acre of superphosphate ensured the crop receiving its requirements of phosphatic fertiliser.

The two plots were compared with the control plot, which received 90-100 lbs. per acre of superphosphate only.

Each plot was one-eighth of an acre in area, and was repeated so that the experiment was comprised of five sections, each of three plots.

MANGANESE EXPERIMENT.

Planted on 22nd May, 1931. Superphosphate—90-100lb. per acre. Variety.—Noongaar. Seed—30lb. per acre.

Quantity of Manganese Sulphate per acre.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%
26lb.	*	17 52	18 16	19 44	18 16	18 32	108
Nil	15 52	18 24	16 40	18 0	17 4	17 12	100
52lb.	18 32	17 52	17 52	17 12	18 0	17 54	104

* Discarded owing to accident when harvesting.

These results indicate that no substantial increase in yield resulted from the application of a manganese fertiliser under the conditions of the experiment at Yilgarn.

FIELD EXPERIMENTS WITH WHEAT, 1931.

DAMPAWAH EXPERIMENT FARM, PERENJORI.

I. THOMAS, Superintendent of Wheat Farms.
F. GISHUBL, Farm Manager.

The farm is situated 30 miles East of Perenjori, being formerly a portion of Karara Station on the fringe of the Lower Murchison.

The soil is a red friable loam, uniform in appearance, and was originally timbered with York gum, giant mallee, karara and mulga scrub.

This is the first crop grown on this land, which was cleared during 1929 and the early part of 1930. After the burn, as would be expected, a large quantity of ashes remained on the whole area.

During the winter months (July to August) of 1930 the land was ploughed 3-4 inches deep with a disc cultivating plough.

Owing to the subsequent dryness of the season, no further working of the fallow followed until just at seeding time. Planting was done by means of a combined cultivator drill.

The following table shows the rainfall registered at the farm since it was established:—

—	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
1928	*	*	*	*	164	94	238	142	71	34	743	6	156	†
1929	17	220	64	...	267	234	60	62	18	33	674	120	...	1,095
1930	...	...	93	123	48	404	160	93	22	41	768	31	54	1,069
1931	...	12	3	25	237	113	232	95	131	40	848	179	120	1,187

* No records. † Incomplete.

Only 40 points were registered up to May, and this absence of early rains as not conducive to the preparation of a good seed bed. Heavy rains fell during the early part of May, but these were followed by a dry spell lasting well into the month of June. This caused considerable anxiety for the germinating crops. However, good rains from the end of June to early October followed the dry spell.

Severe frosts were recorded from as early as May to as late as October. The earlier frosts had the effect of retarding crop growth, but better progress was made with the advent of warmer weather in early August. Towards the end of August, however, strong hot winds affected the crops, blackening the flag and causing considerable concern for the crops just coming into ear.

The crops planted in May appeared to be the most affected. The rain which fell during September and early October appeared to revive these crops, but the affected patches were subsequently found to have produced but little grain.

Time of Seeding Experiment.

The object of this experiment is to determine the most suitable month to plant the wheat crop.

For the purpose of the experiment two varieties were used, Nabawa, a mid-season, and Gluyas Early, an early maturing variety.

The Nabawa plots were planted mid-April, May, and June, and the Gluyas Early plots mid-May, June, and July.

The results are tabulated below:—

TIME OF SEEDING EXPERIMENT.

Variety—Nabawa. Superphosphate—90lb. per acre. Seed—45lb. per acre.

Planted.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1930-31.		Percentage Yields, 1930–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
April	8	48	7	44	7	20	7	28	9	12	8	6	88	7	0	112
May	9	28	8	56	9	4	9	4	9	44	9	15	100	6	16	100
June	4	0	4	40	4	16	4	48	4	16	4	24	48	2	12	35

TIME OF SEEDING EXPERIMENT.

Variety—Gluyas Early. Superphosphate—90lbs. per acre. Seed—45lbs. per acre.

Planted.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1930–31.		Percentage Yields, 1930–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
June	11	12	11	12	12	48	12	24	12	48	12	5	135	7	56	86
May	9	4	8	48	9	4	8	56	9	4	8	59	100	9	17	100
July	2	24	2	40	3	12	3	20	2	24	2	48	31	2	43	29

These results are not in agreement with those of the previous year. This year the Nabawa has given higher returns when sown in May rather than in April, whilst the Gluyas Early has yielded better when planted in June rather than in May.

The seasonal conditions already described were responsible for diminished yields, particularly in the May sown plots. Also late rains were more beneficial to the June sown plots rather than to those planted earlier.

In view of this and also of the lack of confirmation with the previous year's results, we cannot draw any conclusions from the results of this experiment to date.

Experience and experiments at other experiment farms, however, have shown that it is not advisable to extend the planting beyond the month of May. Rather than continue the planting period into June, it is better to plant suitable maturing varieties during April.

Rate of Seeding Experiment.

The object of this experiment is to ascertain the most economical rate at which to plant the wheat crop with:—

(a) A midseason, free-stooling variety;

(b) An early, sparse-stooling variety.

To meet the requirements of the former, the standard variety Nabawa was used, and for the latter, the variety Noongaar.

RATE OF SEEDING EXPERIMENT.

Planted on 20th April, 1931. Superphosphate—90lb. per acre. Variety—Nabawa.

Rate of Seed per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per acre, 1929–31.	Percentage Yields, 1929–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus. lbs.	%	bus. lbs.	%
30lbs.	10	0	10	24	10	32	10	24	11	20	10 32	112	10 36	109
45lbs.	8	32	8	32	9	44	10	0	10	24	9 27	100	9 47	100
60lbs.	8	24	8	24	8	48	9	12	9	52	8 56	95	9 7	93

RATE OF SEEDING EXPERIMENT.

Planted on 19th May, 1931. Superphosphate—90lb. per acre. Variety—Noongaar.

Rate of Seed per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per acre, 1929–31.	Percentage Yields, 1929–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus. lbs.	%	bus. lbs.	%
30lbs.	7	52	7	52	8	56	8	32	8	48	8 24	104	11 14	103
45lbs.	7	44	8	8	8	16	8	24	7	44	8 8	100	10 54	100
60lbs.	7	12	7	52	8	8	8	16	7	12	7 44	96	10 25	96

The results with both the midseason variety Nabawa, and the early variety Noongaar, confirm previous years' results, and indicate that no advantage is obtained when the heavier rates of planting are used.

Rate of Application of Superphosphate Experiment.

This experiment is divided into two sections in order to test the effects of applying the following amounts of superphosphate per acre with the wheat crop:—

Section 1:

No super.

150 lb. per acre (Control).

75 lb. per acre.

Section 2:

225 lb. per acre.

150 lb. per acre (Control).

300 lb. per acre.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

Planted on 7th May, 1931. Variety—Gluyas Early. Seed—45lb. per acre.

Rate of Application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre.		Percentage Yields.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
No Super.	6	24	6	8	7	4	6	56	6	8	6	32	62	6	46	43
150lb.	10	24	10	56	11	36	10	24	9	20	10	32	100	15	40	100
75lbs.	11	44	11	12	11	4	10	48	9	28	10	51	103	14	35	93

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

Planted on 7th May, 1931. Variety—Gluyas Early. Seed—45lb. per acre.

Rate of Application of Superphosphates.	Computed Yields per Acre.										Average Yields per acre. 1931.		Percentage Yields, 1931.	Average Yields per acre, 1929–31.		Percentage Yields, 1929–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
225lbs.	9	4	10	56	9	52	8	0	8	24	9	15	95	15	0	98
150lbs.	9	44	10	48	9	28	9	12	9	20	9	42	100	15	20	100
300lbs.	9	52	9	36	8	16	8	16	9	44	9	9	94	15	17	100

These results confirm those of previous years and also those obtained at the other experiment farms in indicating that no advantage is derived from applying superphosphate at rates above 150 lb. per acre.

This year's results do not indicate an advantage from applications greater than 75 lb. per acre, but this not consistent with the average results from this and other experiment farms.

Nitrogen Experiment, 1931.

The object of this experiment is to determine whether increased yields are obtained when heavy dressings of nitrogenous fertiliser are applied to the wheat crop, in addition to an application of superphosphate.

For the purpose of the experiment, two rates of sulphate of ammonia were applied, viz., 1 cwt. and 2 cwt. respectively.

Superphosphate was applied to all plots at the rate of 120 lbs. per acre, and those plots to which superphosphate only was applied were treated as controls. Comparisons were made between these control plots and those receiving 1 cwt. and 2 cwt. of sulphate of ammonia respectively. The fertilisers were applied at seeding time. The plots were repeated five times, the whole experiment being sown on fallowed and unfallowed land.

The results obtained are shown hereunder:—

NITROGEN EXPERIMENT.

FALLOW SECTION.

Planted on 8th May, 1931. Variety—Gluyas Early. Seed—45lbs. per acre. Superphosphate—120lbs. per acre.

Rate of Application of Sulphate of Ammonia per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1930-31.		Percentage Yields, 1930-31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
112lbs.	8	48	10	0	7	36	8	48	9	12	8	53	84	8	5	87
Nil	10	48	11	20	10	0	10	40	9	52	10	32	100	9	15	100
224lbs.	8	48	8	56	8	0	8	16	9	36	8	43	83	7	18	79

NITROGEN EXPERIMENT.

NON-FALLOW SECTION.

Planted on 8th May. Variety—Gluyas Early. Seed—45lbs. per acre. Superphosphate—120lbs. per acre.

Rate of Application of Sulphate of Ammonia per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1930-31.		Percentage Yields, 1930-31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
112lbs.	6	32	7	12	6	32	6	24	5	36	6	27	82	6	18	83
Nil	7	36	8	24	8	16	7	36	7	20	7	50	100	7	34	100
224lbs.	6	0	5	44	5	52	5	20	5	44	5	44	73	5	26	72

These results, which are for three years in the case of the fallow section, and for two years in the non-fallow section, indicate that no advantage is obtained by the application of a nitrogenous fertiliser to either fallowed or unfallowed land.

Manganese Experiment.

The object of this experiment is to determine whether any increase in yield is obtained by adding a manganese fertiliser to the wheat crop at planting time.

Manganese sulphate was applied as follows:—

Plot No. 1.—28 lb. manganese sulphate per acre and 112 lb. superphosphate per acre.

Plot No. 2.—112 lb. superphosphate per acre (Control).

Plot No. 3.—56 lb. manganese sulphate per acre and 112 lb. superphosphate per acre.

The results obtained are as follow:—

MANGANESE EXPERIMENT.

Planted on 18th May, 1931. Variety—Gluyas Early. Seed—45lb. per acre. Superphosphate—112lb. per acre.

Quantity of Manganese Sulphate per Acre.	Computed Yields per Acre.										Average Yields per Acre, 1931.		Percentage Yields, 1931.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
28lb.	10	24	11	12	11	36	11	20	12	0	11	18	100
Nil (Control)	11	4	11	4	11	52	10	48	11	52	11	20	100
56lb.	11	12	11	28	11	52	12	0	13	12	11	57	105

These results are similar to those obtained at the other experiment farms and indicate that no substantial increase in yield was obtained by the application of a manganese fertiliser to the wheat crop.

Seasonal Planting Experiment.

The objects of this experiment are:—

1. To ascertain the most suitable month to plant the late, midseason, early, and very early maturing varieties of wheat.
2. To determine the most prolific of each of the above types.

To meet the requirements of the experiment, three sections were needed, viz.:—

(a) Section 1, planted in April, representing early planting.

(b) Section 2, planted in May, representing midseason planting.

(c) Section 3, planted in June, representing late planting.

Each section, planted in its respective month, was repeated five times, all plots being eventually harvested for grain.

The standard early variety, Gluyas Early, was planted in the control plots in all sections.

SEASONAL PLANTING EXPERIMENT.

APRIL PLANTING.

Planted on 14th April, 1931. Superphosphate—90lb. per acre. Seed—45lb. per acre.

Variety.	Maturity.	Computed Yields per Acre.										Average Yields per Acre, 1931.		Percentage Yields, 1931.
		Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Bencubbin ...	Early ...	9	20	10	24	11	12	10	32	11	20	10	34	95
Gluyas Early	Early ...	11	12	10	56	11	28	10	56	11	20	11	10	100
Nabawa ...	Midseason	9	4	8	32	8	24	8	32	8	40	8	38	77
S.H.J. ...	Early ...	10	32	11	28	10	48	10	32	10	48	10	50	93
Gluyas Early	Early ...	12	8	12	40	11	28	11	28	10	24	11	38	100
Carrabin ...	Early ...	11	12	11	52	10	40	11	20	9	44	10	58	94
Merredin ...	Early ...	10	8	10	0	8	16	9	44	9	4	9	26	81
Gluyas Early	Early ...	11	12	11	44	11	28	12	16	11	28	11	38	100
Noongaar ...	Very Early	12	8	12	40	12	8	12	32	12	16	12	21	106

SEASONAL PLANTING EXPERIMENT.

MAY PLANTING.

Planted on 14th May, 1931. Superphosphate—90lb. per acre. Seed—45lb. per acre.

Variety.	Maturity.	Computed Yields per Acre.										Average Yields per Acre, 1931.		Percentage Yields, 1931.
		Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Geeralying ...	Early ...	7	36	6	0	5	52	5	20	5	12	6	0	53
Gluyas Early	Early ...	12	16	12	24	10	48	10	56	10	24	11	22	100
S.H.J. ...	Early ...	5	12	5	20	6	8	4	48	4	8	5	7	45
Bencubbin ...	Midseason	14	32	12	56	13	44	12	32	12	48	13	18	117
Gluyas Early	Early ...	11	36	11	52	11	52	11	12	10	24	11	23	100
Nabawa ...	Midseason	8	48	8	56	7	28	6	56	7	28	7	55	70
Carrabin ...	Early ...	10	40	10	8	8	16	7	44	7	36	8	53	75
Gluyas Early	Early ...	13	12	12	32	12	8	10	40	10	40	11	50	100
Merredin ...	Early ...	8	32	9	12	9	20	7	20	7	4	8	18	70
Gluyas Early	Early ...	11	36	12	8	12	48	11	20	10	40	11	42	100
Noongaar ...	Very Early	8	48	6	8	6	0	4	48	5	12	6	11	53

SEASONAL PLANTING EXPERIMENT.

JUNE PLANTING.

Planted on 15th June, 1931. Superphosphate—90lb. per acre. Seed—45lb. per acre.

Varieties.	Maturity.	Computed Yields per Acre.										Average Yields per Acre, 1931.		Percentage Yields, 1931.
		Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Geeralying ...	Early ...	10	56	12	32	12	24	11	36	11	36	11	49	101
Gluyas Early	Early ...	11	4	11	28	12	24	11	36	11	44	11	39	100
S.H.J. ...	Early ...	11	20	12	48	11	52	12	0	11	28	11	54	102
Merredin ...	Early ...	10	56	12	16	11	44	10	56	11	28	11	28	99
Gluyas Early	Early ...	11	4	11	52	11	12	11	20	12	16	11	33	100
Noongaar ...	Very Early	14	8	14	16	14	8	13	28	14	32	14	6	122

These results indicate the suitability of the early and very early maturing varieties for this district.

The midseason variety, Bencubbin, shows to considerable advantage in the May planting, and the very early variety Noongaar in the June planting. Of the early varieties, the standard variety, Gluyas Early, shows to best advantage.

FIELD EXPERIMENTS WITH WHEAT, 1931.

CHAPMAN EXPERIMENT FARM.

I. THOMAS, Superintendent of Wheat Farms; F. L. SHIER, Farm Manager.

The following table shows the monthly rainfalls, as recorded at the farm, during 1931, together with the averages over the past 26 years.

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sep.	Oct.	Total.			
1931	...	...	12	61	459	241	486	273	200	96	1,755	125	56	2,009
Average, 26 years	17	42	67	63	241	441	367	247	170	99	1,598	32	26	1,841

The rainfall during the autumn months was very light, no rain of any consequence falling until the 3rd of May. From this date up to the 16th almost continuous rains were experienced, 453 points being recorded. In consequence, seeding operations were delayed during that period. However, this was followed by a dry period lasting until the 8th of June, enabling crops to be planted under ideal conditions. Good rains were experienced throughout the growing period, 1,755 points being recorded from 1st May to 31st October.

The land on which the experiments were conducted originally carried jam and wattle timber, with a sprinkling of york gum. It was ploughed with a mouldboard plough to a depth of 4 inches during June and July, 1930, springtyne cultivated during September and October, and again immediately prior to seeding.

TIME OF SEEDING EXPERIMENT.

This experiment was commenced in 1923, and has been planted each year since with the early maturing variety Gluyas Early, but owing to the plots being destroyed by fire in 1924 and other factors interfering with the results in 1925 and 1926, the results were not obtained for these years.

Commencing in 1928, the midseason variety, Nabawa, was included in the experiment.

Each variety was planted as a separate experiment, the Gluyas Early being planted in mid-May, June, and July, and the Nabawa in mid-April, May, and June.

TIME OF SEEDING EXPERIMENT.

Variety—Nabawa. Superphosphate—112lbs. per Acre. Seed—60lbs. per Acre.

Planted.	Computed Yields per Acre,										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1928–31.		Percentage Yields, 1928–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
April 16th ...	9	20	9	4	8	48	8	48	9	4	9	1	69	8	57	77
May 16th ...	14	32	13	4	12	48	12	40	12	32	13	7	100	11	41	100
June 15th ...	12	16	11	28	10	48	10	40	11	52	11	25	87	10	45	92

TIME OF SEEDING EXPERIMENT.

Variety—Gluyas Early. Superphosphate—112lbs. per Acre. Seed—60lbs. per Acre.

Planted.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1928–31.		Percentage Yields, 1928–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
June 16th ...	9	4	8	16	7	12	8	16	8	8	8	11	60	12	41	81
May 19th ...	13	26	12	48	13	36	13	28	14	40	13	38	100	15	38	100
July 15th ...	6	40	6	56	6	24	6	32	7	12	6	45	50	8	5	52

This year's results confirm the average results over a number of years, and indicate the advisability of planting the wheat crop during the month of May.

RATE OF SEEDING EXPERIMENT.

This experiment is carried out with an early sparse-stooling variety, S.H.J., and a midseason free-stooling variety, Nabawa, the object being to ascertain the most economical rate to plant the wheat crop. The experiment has been conducted since 1923, but in 1926 the results of the free-stooling variety were influenced by outside factors, and are therefore not included in the averages.

RATE OF SEEDING EXPERIMENT.

Planted on 14th May, 1931. Variety—Nabawa. Superphosphate—112lbs. per Acre.

Rate of Seed per per acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1923–31.		Percentage Yields, 1923–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
60lbs.	17	36	17	20	16	16	17	12	17	4	17	5	105	15	26	100
45lbs.	16	48	16	8	16	8	16	24	16	0	16	17	100	15	25	100
90lbs.	16	56	16	56	17	20	17	44	16	32	17	5	105	16	19	106

RATE OF SEEDING EXPERIMENT.

Planted on 29th May, 1931. Variety—S.H.J. Superphosphate—112lbs. per acre.

Rate of Seed per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields, per acre, 1923–31.		Percentage Yields, 1923–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
60lbs.	15	52	15	20	16	0	15	20	16	0	15	42	118	16	23	107
45lbs.	13	12	12	56	13	44	13	4	13	44	13	20	100	15	23	100
90lbs.	14	56	16	56	16	16	16	56	16	56	16	24	123	16	52	110

The results for both varieties show that it is advantageous to increase the rate of seed to above 45 lbs. per acre, probably the most economical rate being 60 lbs. per acre.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

The object of this experiment is to determine whether, when heavy dressings of superphosphate are applied, it would be economical to apply part or all of this fertiliser when cultivating the fallowed land during the autumn months.

The detailed results for 1931, together with the average results for the four years the experiment has been in progress, are shown hereunder:—

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

Planted on 13th May, 1931. Variety—Nabawa. Seed—60lbs. per acre.

Time of Application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1928–31.		Percentage Yields, 1928–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
75lbs. in March, 150lbs. at Seeding	18	48	19	44	19	20	18	24	17	12	18	42	110	14	43	106
225lbs. in March	17	28	18	24	17	36	16	16	15	28	17	2	100	13	48	100
150lbs. in March, 75lbs. at Seeding	17	44	18	24	17	20	15	36	13	28	16	30	97	13	54	101

These results do not indicate any advantage derived from applying part of the fertiliser before seeding, the yields being greatest when the larger portion of the superphosphate was applied at planting.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

The object of this experiment is to ascertain the most profitable rate of superphosphate to apply to the wheat crop.

To meet the requirements the experiment was designed so that the three plot system could be maintained. It was therefore divided into two sections, viz.:—

Section 1, consisting of three plots, which received respectively 300 lbs., 150 lbs., and 225 lbs. per acre.

Section 2, consisting of three plots, which received respectively no superphosphate, 150 lbs., and 75 lbs. of superphosphate.

In each section the rate of 150 lbs. per acre was regarded as the control.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

Planted on 14th May, 1931. Variety—Nabawa. Seed—60lbs. per acre.

Rate of Superphosphate per acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1929–31.		Percentage Yields, 1929–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
300lbs.	19	44	21	36	22	0	21	4	18	40	20	37	111	15	30	105
150lbs.	18	40	18	40	19	28	18	56	17	28	18	38	100	14	46	100
225lbs.	19	52	20	56	20	48	18	40	19	28	19	56	107	15	42	106

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

Planted on 14th May, 1931. Variety—Nabawa. Seed—60lbs. per acre.

Rate of Superphosphate per acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields, per acre, 1929–31.		Percentage Yields, 1929–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
Nil	14	24	13	28	13	52	13	12	13	44	13	44	70	11	37	78
150lbs.	20	0	20	32	18	48	20	48	18	48	19	47	100	14	52	100
75lbs.	17	4	18	0	17	44	17	52	17	12	17	34	89	13	33	91

The plots receiving no superphosphate would benefit from the residual superphosphate applied in previous years. As the experiment will be planted on the same land each year, this residual effect will gradually disappear. However, this year's experiment and the average results over three years indicate that the rate of superphosphate could be increased with advantage above 75 lbs. per acre. Although the applications of higher rates of superphosphate give increased yields, the most economical rate under present economic conditions would probably be about 112 lbs. per acre.

MANGANESE EXPERIMENT.

This experiment was inaugurated to determine whether any advantage was derived from applying a manganese fertiliser to the wheat crop.

Manganese sulphate was applied to separate plots at planting time, as follows:—

Plot 1. 28 lbs. managanese sulphate per acre.

Plot 2. No manganese sulphate (control).

Plot 3. 56 lbs. manganese sulphate per acre.

Superphosphate was applied to all plots at 112 lbs. per acre.

The results obtained are set out hereunder:—

MANGANESE EXPERIMENT.

Planted on 22nd May, 1931. Superphosphate—112lbs. per Acre. Seed—60lbs. per Acre. Variety—Nabawa.

Quantity of Manganese Sulphate per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields. 1931.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
28lbs.	20	16	20	48	20	32	22	8	22	0	21	9	103
Nil (Control)	19	36	19	36	20	48	20	56	22	8	20	37	100
56lbs.	20	16	20	40	20	56	22	8	21	36	21	7	103

These results are for one year only. However, they confirm the results from the other experiment farms, and indicate that no substantial increase in yield results from the application of a manganese fertiliser to the wheat crop.

NITROGEN EXPERIMENT.

The object of this experiment is to determine whether increased yields are obtained when heavy dressings of a nitrogenous fertiliser are applied to the wheat crop in addition to an application of superphosphate.

For the purpose of the experiment two rates of sulphate of ammonia were applied, viz., 1 cwt. and 2 cwts. per acre respectively, the application in each case being at planting time.

Superphosphate was applied to all plots at the rate of 112 lbs. per acre, and those plots to which superphosphate only was applied were treated as controls.

The experiment was conducted on both fallowed and unfallowed land, the results being shown hereunder:—

NITROGEN EXPERIMENT.

FALLOW SECTION.

Planted on 20th May, 1931. Superphosphate—120lbs. per Acre. Seed—60lbs. per Acre. Variety—Nabawa.

Rate of Application of Sulphate of Ammonia per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1929–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
112lbs.	15	28	15	44	18	8	16	0	14	48	16	2	81	98
Nil	21	12	19	12	20	56	18	8	19	20	19	46	100	100
224lbs.	15	28	14	56	15	20	15	20	15	28	15	18	77	94

NITROGEN EXPERIMENT.

NON-FALLOW SECTION.

Planted on 20th May, 1931. Superphosphate—120lbs. per acre. Seed—60lbs. per Acre. Variety—Nabawa.

Rate of Application of Sulphate of Ammonia per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1929–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
112lbs.	20	8	20	48	18	48	19	36	19	4	19	41	105	112
Nil	19	28	19	12	18	40	20	0	16	32	18	46	100	100
224lbs.	20	0	20	16	17	52	21	36	19	36	19	52	106	121

These results do not indicate that any increase in yield can be expected by applying a nitrogenous fertiliser to fallowed land in the Chapman district. They do, however, indicate an increase in yield when the nitrogenous fertiliser is applied to unfallowed land. It is doubtful, however, whether the increase would be sufficient to consider the application of a such a fertiliser as an economical proposition.

SEASONAL PLANTING EXPERIMENT.

The objects of this experiment are:—

1. To ascertain the most suitable month to plant the late, mid-season, early, and very early maturing varieties of wheat; and

2. To determine the most prolific of each of the above types.

To meet the requirements of the experiments, three sections were needed, viz.:—

(a) Section 1, planted in April, representing early planting.

(b) Section 2, planted in May, representing midseason planting.

(c) Section 3, planted in June, representing late planting.

In all sections the standard midseason maturing variety, Nabawa, was planted in the control plots.

The results are given below:—

SEASONAL PLANTING EXPERIMENT.

APRIL PLANTING.

Planted on 15th April, 1931. Superphosphate—112lbs. per Acre. Seed—60lbs. per Acre.

Variety.	Maturity.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1928–31.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
Yandilla King	Late ...	8	16	8	40	9	4	10	32	8	32	9	1	97	81
Nabawa ...	Midseason...	8	16	9	12	9	52	9	52	9	4	9	15	100	100
Sutton ...	Late ...	8	32	10	16	10	56	10	56	10	0	10	8	110	105*
Bencubbin ...	Midseason...	10	32	12	32	13	4	13	20	11	44	12	15	131	143*
Nabawa ...	Midseason...	8	40	9	20	10	0	9	36	9	4	9	20	100	100
Gluyas Early	Early ...	9	4	10	32	11	52	10	32	9	20	10	16	110	105

* Average two years, 1930-31.

SEASONAL PLANTING EXPERIMENT.

MAY PLANTING.

Planted on 18th May, 1931. Superphosphate—112lb. per acre. Seed -60lb. per acre.

Variety.	Maturity.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1928–31.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
Yandilla King	Late ...	15	44	14	40	15	28	15	36	14	32	15	12	99	93
Nabawa ...	Midseason...	16	24	16	0	15	4	15	12	14	8	15	22	100	100
Sutton ...	Late ...	17	4	16	16	16	48	17	4	15	36	16	34	108	111*
Bencubbin ...	Midseason...	18	32	17	52	18	0	18	24	17	12	18	0	116	118*
Nabawa ...	Midseason...	15	44	16	16	14	48	16	0	14	48	15	31	100	100
Comeback ...	Early ...	10	56	12	8	11	12	13	4	12	32	11	58	77	84†
Carrabin ...	Early ...	13	52	13	4	13	52	14	24	14	40	13	58	90	96
Nabawa ...	Midseason...	15	44	14	40	15	20	16	8	15	36	15	30	100	100
S.H.J. ...	Early ...	14	40	15	28	14	32	18	0	17	4	15	57	103	102
Merredin ...	Early ...	13	44	14	56	15	12	16	8	16	48	15	22	99	101
Nabawa ...	Midseason...	14	40	15	44	14	56	15	36	16	32	15	29	100	100
Gluyas Early	Early ...	16	0	15	36	15	12	16	16	16	0	15	49	102	98
Geeralying ...	Early ...	13	4	13	20	14	0	14	8	16	32	14	13	92	96
Nabawa ...	Midseason...	14	40	15	12	15	44	14	16	17	4	15	23	100	100
Noongaar ...	Very Early	12	0	11	36	9	12	11	44	11	36	11	14	73	78

* Average two years, 1930–31. † Average three years, 1929–31.

SEASONAL PLANTING EXPERIMENT.

JUNE PLANTING.

Planted on 16th June, 1931. Superphosphate—112lb. per acre. Seed—60lb. per acre.

Variety.	Maturity.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1928–31.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
Bencubbin ...	Midseason...	12	24	17	44	15	20	10	48	7	12	12	42	112	111*
Nabawa ...	Midseason...	9	52	16	56	12	32	10	16	7	20	11	23	100	100
Comeback ...	Early ...	6	32	13	28	9	28	6	32	4	24	8	5	71	76*
Carrabin ...	Early ...	8	0	14	0	9	52	8	0	6	24	9	15	83	85*
Nabawa ...	Midseason...	9	28	17	4	13	4	9	20	7	4	11	12	100	100
S.H.J. ...	Early ...	11	12	13	36	10	16	7	36	5	44	9	41	86	91
Merredin ...	Early ...	10	0	15	12	10	40	7	20	5	44	9	49	85	89
Nabawa ...	Midseason...	11	20	17	12	12	56	8	56	7	4	11	30	100	100
Gluyas Early	Early ...	10	56	14	40	11	4	7	12	5	28	9	52	86	91
Geeralying ...	Early ...	10	32	13	36	10	32	6	56	6	0	9	31	83	88
Nabawa ...	Midseason...	13	36	16	8	12	48	7	36	7	4	11	26	100	100
Noongaar ...	Very Early	9	36	10	56	8	40	5	20	5	28	8	0	70	80

* Average two years, 1930–31.

In all sections the midseason variety, Bencubbin, has shown to advantage. The late maturing variety, Sutton, has also yielded comparatively well in both the April and May planted sections.

The experiment shows the suitability of the midseason and late maturing varieties for early planting in this district. For later planting, the varieties, Gluyas Early, Merredin, and S.H.J. have proved to be the most suitable of the early maturing varieties.

These results also show, when weeds are troublesome, the advisability of delaying seeding until after the seasonal rains have commenced, and so enable the young weeds to be destroyed prior to planting.

FIELD EXPERIMENTS WITH WHEAT AND OATS, 1931.

AVONDALE STATE FARM.

A. S. Wild, Agricultural Adviser; H. J. Bailey, Farm Manager.

During 1931 the following experiments were conducted at the Avondale State Farm:—

1. A Manganese Experiment with Wheat.
2. A Variety Trial with Oats.

The following table shows the rainfalls, as recorded at the farm during the year, together with the monthly averages over the past six years:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
1931	4	43	93	300	172	320	477	325	44	1,638	...	73	1,851
Average, 6 years	13	35	117	90	177	318	450	258	167	74	1,444	54	36	1,789

The season commenced with good rains during the end of April and early May. This caused the weed seeds to germinate and enabled the destruction of the young weeds and the preparation of a good seed bed.

Severe late frosts were recorded, and this had an adverse effect on the yields The oat plots were also affected by high winds when approaching maturity.

Although diminished during October, the rainfall for the growing period (1,638 points) must be considered as satisfactory. The total rainfall for the year was 1,851 points, the average for this period over six years being 1,789 points.

The land on which the experiments were conducted was typical York gum and jam country which had been cleared for many years. It was ploughed four inches deep during June of the previous year. It was then springtyne cultivated during early April, again in late April, and again just prior to seeding.

MANGANESE EXPERIMENT.

The object of this experiment was to determine whether the application of a manganese fertiliser would benefit the wheat crop. Two rates of manganese sulphate were used, the plots being laid out as follows:—

Plot 1.—28 lbs. manganese sulphate + 112 lbs. superphosphate per acre.

Plot 2.—112 lbs. superphosphate per acre (control).

Plot 3.—56 lbs. manganese sulphate per acre + 112 lbs. superphosphate per acre.

Each plot was one-eighth of an acre in area, and each was repeated five times. The results of the experiment are given in the table below:—

MANGANESE EXPERIMENT.

Planted on 14th May, 1931. Variety—Nabawa. Seed—60lb. per acre. Superphosphate—112lb. per acre.

Quantity of Manganese Sulphate per acre.	Computed Yields per acre.					Average Yields per acre 1931.	Percentage Yields, 1931.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%
28lb.	16 48	17 44	14 16	15 44	12 8	15 20	97
Nil	17 44	15 44	14 48	15 20	15 44	15 52	100
56lb.	17 4	15 20	13 4	15 20	14 24	15 2	95

The above results are similar to those obtained from the same experiment at the other Experiment Farms, and indicate that no increase in yield was obtained by supplementing the superphosphate with a manganese fertiliser.

OAT VARIETY TRIAL.

The object of this experiment is to determine the most suitable variety of oat for grain purposes in districts having similar climatic conditions. The results obtained are as follow:—

OAT VARIETY TRIAL.

Planted on 8th May, 1931. Seed—40lb. per acre. Superphosphate—90lb. per acre.

Variety.	Maturity.	Computed Yields per acre.					Average Yields per acre 1931.	Percentage Yields, 1931.
		Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%
Mulga ...	Early ...	20 24	22 24	23 24	22 24	22 8	22 13	75
Guyra ...	Midseason	31 16	23 0	30 16	34 0	29 24	29 27	100
Burts' Early	Early ...	32 16	22 24	24 0	22 24	20 0	24 13	82
Algerian ...	Late ...	29 32	28 24	29 0	23 0	27 0	27 19	107
Guyra ...	Midseason	31 16	29 32	21 8	26 16	19 24	25 27	100
Lachlan ...	Midseason	28 8	28 16	24 24	27 16	26 16	27 0	105

These results indicate the suitability of the midseason and late maturing varieties. They also confirm previous results (see "Agricultural Journal," June, 1930, page 297), viz., that the late variety, Algerian, and the midseason variety, Guyra, are the most suitable for grain.

FIELD EXPERIMENTS WITH WHEAT AND OATS, 1931.

MERREDIN EXPERIMENT FARM.

I. THOMAS, Superintendent of Wheat Farms.
J. H. LANGFIELD, Farm Manager.

The total rainfall for the year was 1,226 points, of which 912 points fell during the growing period (May to October). The following table shows the monthly rainfall, together with the average over a period of 20 years:—

Year.	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for Year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
1931 ...	...	54	4	191	218	115	197	257	81	44	912	24	40	1,225
Average 20 years ...	52	56	119	85	135	191	189	145	92	73	825	43	54	1,234

The rainfall records indicate a fairly satisfactory season, good rains being recorded from April until the end of August. This, however, was largely offset by the very cold conditions during the winter months, heavy frosts being experienced during June, July, and August. Twenty frosts were recorded during June, the late frosts being less frequent. These cold conditions during these three months of the growing period greatly retarded crop growth, even the early maturing varieties making very slow growth.

Frost also caused considerable damage to all varieties which came into ear during the early part of September. The disease "Takeall" also badly affected all crops sown in April.

Altogether, the season was not very favourable; disease was prevalent, while winter conditions were too severe to permit the usual vigorous crop growth.

The land on which these experiments were conducted originally carried salmon gum and gimlet timber, the soil being typical of such country. For some years the three-year rotation, namely, fallow, crops (chiefly wheat and oats), and pasture has been practised.

Time of Seeding Experiment.

This experiment has been conducted for the past nine years with the variety Gluyas Early planted in mid-May, June, and July. During the last three years the midseason variety Nabawa has also been planted in mid-April, May, and June.

The land was ploughed to a depth of 4 inches in June, 1930, with a heavy disc plough and disc cultivated in September. After rain in April it was harrowed and each plot was cultivated with a springtyne before planting.

The results obtained this year, together with the average results of previous years, are as under:—

TIME OF SEEDING EXPERIMENT.

Variety—Nabawa. Superphosphate—112lb. per acre. Seed—45lb. per acre.

Planted.	Computed Yields per acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1929-31.		Percentage Yields, 1929-31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs	%
April 16th	12	48	12	0	13	52	18	32	16	24	14	43	67	23	45	99
May 16th	22	48	19	44	20	24	26	48	19	52	21	55	100	24	11	100
June 16th	18	32	17	36	16	56	18	32	20	48	18	29	84	16	9	67

TIME OF SEEDING EXPERIMENT.

Variety—Gluyas Early. Superphosphate—112lb. per acre. Seed—45lb. per acre.

Planted.	Computed Yields per acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1923-31.		Percentage Yields, 1923-31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
June 18th	23	44	25	36	25	4	27	44	25	28	25	31	101	22	1	85
May 15th	24	32	25	28	24	32	27	28	24	16	25	15	100	25	56	100
July 14th	18	32	19	52	19	28	19	52	19	52	19	31	77	13	16	51

The absence of early rains to germinate the weed seeds, combined with the exceptionally cold weather in June, resulted in the April sown plots being badly infested with wild oats. In addition there was a considerable amount of "Take-all."

Thus, contrary to the experience of previous years, the yield from the April sown plots planted with the variety Nabawa, fell considerably below that from the control plots planted in May.

However, the results confirm the conclusion that it is inadvisable to extend the planting period into the month of June. Should it not be possible to complete the seeding during May, it is preferable to plant a suitable midseason-maturing variety in April.

This year's experience, however, indicates that on land where weeds are troublesome, even this practice is attended by considerable risk.

Rate of Seeding Experiment.

As in previous years this experiment was carried out with two varieties, viz., Nabawa, representing the free-stooling varieties, and Noongaar, representing the sparse-stooling varieties.

Owing to the apparent interference with some of the plots by outside factors, the results for this year from the Nabawa plots cannot be taken for comparison and are therefore discarded.

The land was ploughed in June, 1930, to a depth of 4 inches, and cultivated during August-September with a cultivating plough. After rain in early April it was harrowed and springtyne cultivated. It was found necessary to utilise the disc cultivator prior to seeding in order to destroy weed growth.

The results are as hereunder:—

RATE OF SEEDING EXPERIMENT.

Planted on 1st June, 1931. Variety—Noongaar. Superphosphate—112lb. per acre.

Rate of Seed per acre.	Computed Yields per acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1923-31.		Percentage Yields, 1923-31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
30lb.	25	12	24	16	22	16	21	52	21	44	23	4	95	18	26	97
45lb.	25	36	25	44	21	52	23	12	24	48	24	14	100	19	0	100
60lb.	27	20	25	20	22	16	24	24	25	4	24	53	103	18	41	98

The results obtained this year confirm those of previous years, indicating that it is unnecessary to sow the spare-stooling varieties at more than 45 lb. per acre.

Time of Application of Superphosphate Experiment.

The object of this experiment is to determine whether, when heavy dressings of superphosphate are applied, it would be profitable to apply part or whole of the amount when cultivating the fallowed land during late summer or early autumn.

The land was ploughed in June, 1930, to a depth of 4 inches and cultivated in August with a disc cultivating plough. It was harrowed after rain on 7th April, then worked with a tandem disc cultivator and afterwards with a springtyne.

The results, together with those of previous years, are given below:—

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

Planted on 16th May, 1931. Variety—Gluyas Early. Seed—45lb. per acre.

Time of Application of Superphosphate.	Computed Yields per acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1928-31.		Percentage Yields, 1928-31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus	lbs.	%
75lb. in March ; 150lb. at Seeding	30	24	28	16	30	8	30	16	28	48	29	34	108	25	42	107
225lb. in March ...	27	44	26	40	27	52	26	32	27	52	27	20	100	24	7	100
150lb. in March ; 75lb. at Seeding	26	32	28	0	27	12	27	12	28	24	27	28	100	25	30	106

These results indicate that the yield of a wheat crop is decreased when portion of the fertiliser is not applied at seeding time.

Rate of Application of Superphosphate Experiment.

This experiment is divided into two sections, in each of which plots treated with 150 lb. of superphosphate per acre are regarded as controls. Thus in Section 1, the rates of 300 lb. and 225 lb. per acre are compared with the control rate of 150 lb. per acre and in Section 2, the rates of 75 lb. per acre and no superphosphate are compared with the same control rate of 150 lb.

From the yields of the plots where no superphosphate was applied, it is evident that the crop was benefiting from the residual effects of previous dressings. This residue, however, will eventually become exhausted as the "No superphosphate" plot falls in the same position in succeeding years.

The land received similar working to that of the Time of Application of Superphosphate Experiment.

The results obtained are shown hereunder:—

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

Planted on 16th May, 1931. Variety—Gluyas Early. Seed—45lb. per acre.

Rate of Application of Superphosphate per acre	Computed Yields per acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1929-31.		Percentage Yields, 1929-31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
300lb.	29	44	29	28	30	8	30	56	26	40	29	23	101	28	33	105
150lb.	28	40	28	40	29	52	29	20	28	56	29	6	100	27	12	100
225lb.	30	24	28	56	29	36	27	12	30	24	29	18	101	28	7	103

RATE OF APPLICATION OF SUPERPHOSPHATE. EXPERIMENT.

Planted on 16th May, 1931. Variety—Gluyas Early. Seed—45lb. per acre.

Rate of Application of Superphosphate per acre.	Computed Yields per acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1929-31.		Percentage Yields, 1929-31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
No Superphosphate ...	24	24	21	12	18	48	18	56	14	16	19	31	71	17	30	63
150lbs.	31	20	27	12	25	36	26	8	26	48	27	25	100	27	36	100
75lbs.	27	20	30	24	26	40	22	24	27	36	26	53	98	25	45	93

The average results for three years indicate that the rate of superphosphate applied per acre should be not less than 75 lb. and that the most profitable rate under present economic conditions would be about 112 lb. per acre.

Seasonal Planting Experiment.

The objects of this experiment are:—

1. To ascertain the most suitable month for planting the early, midseason, and late maturing varieties of wheat.
2. To determine the most prolific of the three types.

To meet the requirements of this experiment three sections were needed, viz.:—

(a) Section 1, planted in April, representing early planting.

(b) Section 2, planted in May, representing midseason planting.

(c) Section 3, planted in June, representing late planting.

The arrangement of this experiment was similar to that of last year. Nabawa was planted as the control in each of the three sections.

The land was ploughed in June, 1930, to a depth of 4 inches with disc ploughs and cultivated in August with a disc cultivating plough. After rain in April it was harrowed, then worked with a tandem disc cultivator and afterwards with a springtyne cultivator.

The tabulated results are shown hereunder:—

SEASONAL PLANTING EXPERIMENT.

APRIL PLANTING.

Planted on 17th April, 1931. Superphosphate—112lb. per acre. Seed—42lb. per acre.

Variety.	Maturity.	Computed Yields per acre.										Average Yields, per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1928-31.
		Sec. 1.		Sec. 2		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus	lbs.	bus.	lbs.	bus.	lbs.	%	%
Yandilla King ...	Late ...	18	16	15	12	14	16	14	48	15	44	15	39	110	82
Nabawa ...	Midseason ...	18	24	12	24	11	12	15	20	14	8	14	18	100	100
Bencubbin ...	Midseason ...	27	20	13	20	15	52	20	16	17	52	18	56	132	115*
Sutton ...	Late ...	19	12	10	32	14	8	17	12	13	44	14	58	104	...
Nabawa ...	Midseason ...	15	36	11	20	15	12	17	20	12	40	14	26	100	100
Gluyas Early ...	Early ...	11	20	7	4	8	48	9	36	6	40	8	42	60	82
Totadgin ...	Early ...	9	36	8	16	11	12	10	48	7	36	9	30	71	89†
Nabawa ...	Midseason ...	15	20	11	28	14	40	13	52	11	44	13	25	100	100
Carrabin ...	Early ...	10	32	4	0	5	52	4	56	4	48	6	2	45	82

* 1929–31. † 1930–31.

SEASONAL PLANTING EXPERIMENT.

MAY PLANTING.

Planted on 20th May, 1931. Superphosphate—112lb. per acre. Seed—45lb. per acre.

Variety.	Maturity.	Computed Yields per acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1928-31.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
Yandilla King ...	Late ...	25	4	23	44	18	8	21	4	18	8	21	14	93	77
Nabawa ...	Midseason ...	26	48	24	40	20	40	20	8	22	8	22	53	100	100
Sutton ...	Late ...	22	16	22	40	17	12	18	0	20	24	20	6	88	...
Bencubbin ...	Midseason ...	25	36	27	36	22	8	24	16	26	0	25	7	119	114*
Nabawa ...	Midseason ...	22	48	23	12	20	8	19	36	20	32	21	15	100	100
Merredin ...	Early ...	26	48	26	16	23	20	23	20	27	12	25	23	120	110
Gluyas Early ...	Early ...	28	56	27	20	23	4	21	28	26	8	25	23	121	110
Nabawa ...	Midseason ...	23	28	19	44	19	52	18	32	23	28	21	1	100	100
Totadgin ...	Early ...	30	40	27	52	24	40	24	0	26	56	26	50	128	...
Carrabin ...	Early ...	26	56	24	56	20	32	18	8	20	48	22	16	95	100
Nabawa ...	Midseason ...	29	12	23	36	20	16	21	20	22	48	23	26	100	100
Geeralying ...	Early ...	31	4	28	8	23	52	23	4	27	44	26	46	114	100
S.H.J. ...	Early ...	24	40	26	16	20	0	20	16	22	48	22	48	100	95
Nabawa ...	Midseason ...	25	20	25	52	19	4	19	44	24	8	22	50	100	100
Noongaar ...	Very Early ...	27	4	25	20	22	56	20	56	23	36	23	58	105	110

* 1929-31.

SEASONAL PLANTING EXPERIMENT.

JUNE PLANTING.

Planted on 16th June, 1931. Superphosphate—112lb. per acre. Seed—45lb. per acre.

Variety.	Maturity.	Computed Yields per acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1928-31.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
Bencubbin ...	Midseason ...	20	0	15	28	20	40	17	23	17	4	18	8	109	117
Nabawa ...	Midseason ...	19	12	13	52	18	32	16	48	15	20	16	45	100	100
Gluyas Early ...	Early ...	20	48	14	8	20	0	17	28	16	56	17	52	107	113*
Totadgin ...	Early ...	20	0	15	20	21	28	18	24	19	36	18	58	137	...
Nabawa ...	Midseason ...	16	16	11	28	15	4	12	48	13	36	13	50	100	100
Merredin ...	Early ...	18	48	16	56	16	32	13	36	16	8	16	24	119	112
S.H.J. ...	Early ...	12	32	12	32	11	52	9	44	11	52	11	42	79	90
Nabawa ...	Midseason ...	14	48	15	12	15	28	12	48	15	36	14	46	100	100
Carrabin ...	Early ...	11	36	13	12	13	44	11	4	12	56	12	30	85	97
Geeralying ...	Early ...	15	44	16	56	17	4	14	16	19	4	16	37	103	98
Nabawa ...	Midseason ...	14	0	17	52	15	4	14	16	19	36	16	10	100	100
Noongaar ...	Very Early...	14	56	18	0	16	56	16	56	20	16	17	25	107	115

* 1929-31.

It will be seen that the midseason maturing variety, Bencubbin, has shown to advantage in all sections, particularly when planted during April.

The results of the new early variety, Totadgin, in both the two later planting sections, are most encouraging, and it appears to challenge Gluyas Early as the standard early variety.

Generally the experiment indicates that the early and very early maturing varieties are unsuitable for early planting in this district. However, they do show to considerable advantage when planted in May and June, the higher and therefore the more profitable yields being obtained from planting during the former month.

Of the early varieties, Totadgin, Gluyas Early, Merredin, and Noongaar have given the most satisfactory yields.

Nitrogen Experiment.

The objects of this experiment are:—

1. To determine whether increased yields are obtained when heavy dressings of a nitrogenous fertiliser are applied to the wheat crop in addition to an application of superphosphate.
2. To ascertain whether it is advantageous to apply only part of the nitrogenous fertiliser at seeding time and part during the month of August.

This experiment is divided into two sections, one fallowed and the other unfallowed. The fallowed plots were ploughed in June, 1930, to a depth of 4 inches with a disc plough, springtyne cultivated in September, harrowed after rain in April, and again springtyne and disc cultivated before seeding.

The unfallowed plots were ploughed after rain in early April, then springtyne cultivated, and again cultivated with a disc implement before seeding:

Superphosphate was applied to all plots at the rate of 112 lb. per acre, and those plots to which superphosphate only was applied were treated as controls. For the purposes of the experiment two rates of sulphate of ammonia were applied, viz., 1 cwt. and 2 cwt. respectively, and all plots were repeated five times.

The results obtained are tabulated below:—

NITROGEN EXPERIMENT.

FALLOW SECTION.

Planted on 29th May, 1931. Superphosphate—112lb. per acre. Seed—45lb. per acre. Variety—Gluyas Early.

Rate of Application of Sulphate of Ammonia per acre.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Percentage Yields, 1929-31.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.			
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
½ cwt. at Seeding; ½ cwt. in Aug.	16 8	22 8	22 0	21 52	23 20	21 6	100	100
Nil	19 4	21 12	21 28	22 24	21 36	21 9	100	100
1 cwt. at Seeding	21 44	21 52	21 36	22 24	21 20	21 47	103	102
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
1 cwt. at Seeding; 1 cwt. in Aug.	21 52	20 56	21 4	22 40	22 8	21 44	103	103
Nil	20 24	21 12	20 56	22 56	20 16	21 9	100	100
2 cwt. at Seeding	20 24	21 44	21 44	23 44	20 16	21 34	102	104

NITROGEN EXPERIMENT.

UNFALLOWED SECTION.

Planted on 29th May, 1931. Superphosphate—112lb. per acre. Seed—45lb. per acre. Variety—Gluyas Early.

Rate of Application of Sulphate of Ammonia per acre.	Computed Yields per acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Percentage Yields, 1929-31.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.			
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
½ cwt. at Seeding; ½ cwt. in Aug.	14 40	16 16	16 40	15 28	18 56	16 24	101	101
Nil	14 16	15 12	14 56	16 32	20 40	16 19	100	100
1 cwt. at Seeding	15 20	14 8	15 28	16 40	20 0	16 19	100	98
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
1 cwt. at Seeding; 1 cwt. in Aug.	19 52	18 0	17 12	15 44	14 40	17 6	99	102
Nil	20 32	18 32	17 28	15 44	13 52	17 14	100	100
2 cwt. at Seeding	19 28	17 36	16 32	14 40	14 56	16 38	97	101

The results obtained over the three years that the experiment has been conducted indicate that the applications of heavy dressings of ammonium sulphate do not give any significant increase in the yields either on fallowed or unfallowed land.

Manganese Experiment.

The object of this experiment is to determine whether the application of a manganese fertiliser in addition to superphosphate would result in increased wheat yields.

At planting time manganese sulphate at the respective rates of 28 and 56 lb. per acre supplemented the superphosphate which was applied at the rate of 112 lb. per acre. These two plots were compared with the control plot, which received the superphosphate only.

The land had been ploughed for the experiment during June, 1930. It was springtyne cultivated in September, harrowed after rain in early April, and then disc cultivated prior to seeding.

The results of the experiment are shown hereunder:—

MANGANESE EXPERIMENT.

Planted on May 23rd, 1931. Superphosphate—112lb. per acre.
Variety—Gluyas Early. Seed—45lb. per acre.

Quantity of Manganese Sulphate per acre.	Computed Yield per acre.					Average Yields per acre, 1931.	Percentage Yield, 1931.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.		
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%
28lb.	23 28	21 36	20 24	22 0	21 52	21 52	102
Nil (Control)	22 56	20 56	19 44	21 28	22 16	21 28	100
56lb.	22 56	21 28	22 0	21 4	20 8	21 31	100

These results are similar to those obtained at the other experiment farms. They indicate that no substantial increase in yield resulted from the application of a manganese fertiliser under the soil and climatic conditions at the Merredin Experiment Farm.

Oat Variety Trial.

This experiment has been conducted for the past nine years. The variety Mulga, an early dual purpose oat, is used as the control. Only early and mid-season varieties are planted in this experiment as the late maturing varieties have proved unsuitable for the district. The experiment is divided into hay and grain sections and includes six varieties.

The yields obtained from both hay and grain sections are given below:—

OAT VARIETY TRIAL.

GRAIN SECTION.

Planted on 8th May, 1931. Seed—40lb. per acre. Superphosphate—112lb. per acre.

Variety.	Maturity.	Computed Yields per acre.			Average Yields per acre. 1931.	Percentage Yields, 1931.	Average Yields. per acre, 1930–31.	Percentage Yields, 1930–31.
		Sec. 1.	Sec. 2.	Sec. 3.				
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
Mulga ...	Early ...	37 32	37 32	46 8	40 24	100	38 2	100
Gidgee ...	Midseason ...	37 8	38 24	39 0	38 11	94	37 27	99
Guyra ...	Midseason ...	43 16	39 32	44 16	42 21	106	40 29	104
Mulga ...	Early ...	39 32	40 0	40 32	40 8	100	39 2	100
Mulga ...	Early ...	36 24	43 32	46 0	42 5	100	39 16	100
Palestine ...	Early ...	38 16	39 8	40 24	39 16	94	41 0	104
Belar ...	Midseason ...	40 0	39 24	42 16	40 27	97	35 37	90
Mulga ...	Early ...	40 24	42 24	43 0	42 3	100	40 4	100
Burt's Early...	Early ...	36 32	43 24	42 24	41 0	93	42 9	103
Mulga ...	Early ...	37 34	50 0	44 16	44 0	100	40 36	100

OAT VARIETY TRIAL.

HAY SECTION.

Planted on 8th May, 1931. Seed—40lb. per acre. Superphosphate—112lb. per acre.

Variety.	Maturity.	Computed Yields per acre.		Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per acre, 1930–31.	Percentage Yields, 1930–31.
		Section 1.	Section 2.				
		C. Q. L.	C. Q. L.	C. Q. L.	%	C. Q. L.	%
Mulga	Early	62 1 20	60 2 24	61 2 8	100	59 1 2	100
Gidgee	Midseason ...	71 1 12	67 3 20	69 2 16	113	73 3 0	124
Guyra	Midseason ...	62 3 20	64 1 4	63 2 12	103	58 3 10	102
Mulga	Early	60 2 24	63 1 12	62 0 4	100	57 3 0	100
Mulga	Early	57 1 12	54 0 8	55 2 24	100	56 2 20	100
Palestine ...	Early	46 3 12	44 2 16	45 3 0	82	51 2 8	91
Belar	Midseason ...	61 3 4	62 0 8	61 3 20	113	59 0 2	108
Mulga	Early	53 2 24	55 1 20	54 2 8	100	54 3 16	100
Burt's Early ...	Early	58 3 20	54 0 24	56 2 8	102	56 1 14	100
Mulga	Early	55 3 4	55 2 8	55 2 20	100	56 1 16	100

In 1930 the arrangement of this experiment was altered to facilitate the harvesting operations, and in consequence the average results of the last two years only are shown.

This year, in the grain section, all varieties gave similar yields, the highest average yield of 44 bushels being obtained from the early variety, Mulga, which is used as control. It will be noticed that Burt's Early has proved very satisfactory during the last two years.

In the hay section the highest yield was again obtained from the midseason variety, Gidgee, which has proved satisfactory in previous years.

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FIELD EXPERIMENTS WITH WHEAT AND OATS, 1931.

WONGAN HILLS LIGHT-LANDS FARM.

I. THOMAS, Superintendent of Wheat Farms.
A. R. VENTON, Farm Manager.

The season generally has been a very satisfactory one and all varieties of wheat exceeded expectations. The rainfall for the growing period was again below the average, as shown on the following table, but it was well distributed and the spring rains were good.

Year.	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sep.	Oct.	Total.			
1931	9	6	101	209	174	265	174	143	73	1,038	...	137	1,291
1930	7	...	53	92	66	367	321	149	90	55	1,048	1	98	1,299
18 years—Average	41	53	92	64	197	298	272	194	127	93	1,161	39	54	1,524

Many frosts were experienced, but apparently little harm was done to the crop. Useful rains fell in April, and those varieties planted during that month obtained a good start.

The crops sown during the latter half of May were somewhat handicapped by cold conditions prevailing during the following two months. The good rains and the generally favourable conditions during the late spring were of particular advantage to the late planted crops. A few small patches of the disease, Septoria, were noticed in the early sown Nabawa wheat, but the crop, generally, was very healthy and no empty heads were observed.

The land on which the experiments were carried out is mainly of the tussocky smoke bush type, with some gravelly patches at the North end, chiefly affecting the Time of Planting Experiment and the April portion of the Seasonal Variety Trial, with some light sandy patches at the South, chiefly affecting the June portion of the Seasonal Variety Trial and the Rhenania Experiment.

It was fallowed with the sundercut in June-July, 1930, cross ploughed with the same implement in September, and lightly disced in the following March, also with the same implement. It was tandem disc harrowed in front of the drill, these operations leaving a good seed bed, free from suckers.

Time of Seeding Experiment.

This experiment is being conducted to determine the most suitable month for planting the wheat crop in this district.

The early maturing variety, Gluyas Early, and the midseason-Maturing variety, Nabawa, were used, the former being planted mid-May, June and July, and the latter in April, May and June.

The April sown plots germinated well and were healthy throughout the season. The May sown plots also germinated well, and were also healthy throughout the season, but were considerably behind the April plots in general appearance until the early spring, when growth was very rapid. At maturity the May sown plots of both varieties were very slightly taller than the April sown Nabawa plots, and the ears of the May sown Nabawa were slightly bigger and better filled.

The June and July sown plots were, as usual, rather slow in germinating, and were very poor indeed until early spring, when the June sown plots made very rapid growth and improved greatly, but, at maturity, were still behind the May plots, particularly in length of straw. The July plots also improved during the spring, but were very much inferior to the June plots.

TIME OF PLANTING EXPERIMENT.

Variety—Nabawa. Superphosphate—150lb. per acre. Seed—45lb. per acre.

Planted:	Computed Yields per Acre.					Average Yields per Acre. 1931.	Percentage Yields, 1931.	Average Yields per Acre. 1928–31.	Percentage Yields, 1928–31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
April 16th	16 0	17 36	18 0	17 4	16 56	17 7	89	16 26	103
May 16th	19 28	19 44	19 52	18 48	18 16	19 14	100	15 56	100
June 16th	14 32	16 40	15 20	15 52	13 28	15 10	79	9 0	57

TIME OF PLANTING EXPERIMENT.

Variety—Gluyas Early. Superphosphate—150lb. per acre. Seed—45lb. per acre.

Planted.	Computed Yields per Acre.					Average Yields per Acre 1931.	Percentage Yields, 1931.	Average Yields per acre, 1928–31.	Percentage Yields, 1928–31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
June 16th	16 0	18 32	18 56	18 48	19 12	18 18	94	10 11	66
May 16th	18 24	19 12	20 0	19 28	20 0	19 25	100	15 23	100
July 16th	8 24	9 52	10 56	10 24	12 32	10 26	54	6 20	41

The results again confirm those of former years, viz., it is essential for seeding operations to be completed by the end of May.

Rate of Seeding Experiment.

As was the case in previous years, the experiment was conducted with two varieties, Nabawa (midseason maturing), representing the free stooling, and S.H.J. (early maturing), representing the sparse stooling types respectively.

The results obtained are shown hereunder:—

RATE OF SEEDING EXPERIMENT.

Planted on 18th May, 1931. Variety—Nabawa. Superphosphate—150lb. per acre.

Rate of Seed per Acre.	Computed Yields per Acre.					Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per Acre, 1925–31.	Percentage Yields, 1925–31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
60lb.	19 12	20 24	20 16	20 56	20 24	20 14	103	15 46	103
45lb.	18 24	20 8	19 44	20 0	20 24	19 44	100	15 21	100
90lb.	19 20	20 48	20 32	20 24	21 12	20 27	104	15 41	102

RATE OF SEEDING EXPERIMENT.

Planted on 10th May, 1931. Variety—S.H.J. Superphosphate—150lb. per Acre.

Rate of Seed per Acre.	Computed Yields per Acre.										Average Yields per Acre, 1931.		Percentage Yields, 1931.	Average Yields per acre 1925-31.		Percentage Yields, 1925-31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
60lb.	14	0	13	36	14	8	15	52	16	48	14	53	99	12	34	102
45lb.	14	48	13	52	14	56	15	12	16	0	14	58	100	12	19	100
90lb.	14	0	14	48	15	20	16	32	16	24	15	25	103	13	1	106

Neither the results for 1931 nor the average results indicate any advantage through increasing the amount of seed sown above 45 lb. per acre, either of the free stooling or of the sparse stooling varieties.

Time of Application of Superphosphate Experiment.

The object of this experiment is to determine whether, when heavy dressings of superphosphate are applied, it would be profitable to apply part or whole of the amount when cultivating the fallowed land during the late summer and early autumn.

For the purposes of the experiment, three plots were required.

Plot 1 received 75 lb. in March and 150 lb. at seeding.

Plot 2 was treated as control and received the whole 225 lb. in March.

Plot 3 received 150 lb. in March and 75 lb. at seeding.

Germination was good and growth healthy and robust on those plots which received a dressing of superphosphate at seeding. Germination and growth generally were somewhat uneven where no superphosphate was applied at seeding, but as the season advanced this became less apparent.

At maturity the whole experiment was very attractive generally, and only a very close examination showed that the control plots were slightly inclined to be uneven in growth.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

Planted on 1st May, 1931. Superphosphate—225lb. per Acre. Seed—45lb. per Acre.
Variety—Nabawa.

Time of Application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average Yields per acre, 1928-31.		Percentage Yields, 1928-31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
75lbs. in March ; 150lbs. at Seeding	25	12	23	36	24	8	24	40	24	0	24	19	103	19	4	112
225lbs. in March ...	23	44	23	28	23	20	23	36	23	36	23	33	100	16	58	100
150lbs. in March ; 75lbs. at Seeding	23	20	24	0	23	44	23	44	24	16	23	49	101	18	10	107

These results confirm those of last year, viz., that yields are decreased when all or portion of the superphosphate is not applied at seeding time.

Rate of Application of Superphosphate Experiment.

The object of this experiment is to determine the most profitable amount of superphosphate to apply on this type of country.

Two sections of 15 plots each were planted. In No. 1 section the rates of superphosphate were 150 lb., 225 lb., and 300 lb. per acre; and in No. 2, 75 lb., 150 lb., and no superphosphate, each being repeated five times.

Germination throughout the experiment was fairly even, but from the time the plants were just above the ground, the plots without superphosphate made absolutely no growth until the spring and many of the plants died. Very few of the plants produced grain, and were only from 4 in. to 6 in. high.

Owing to a mistake, the whole experiment was about 20 inches to one side, and therefore a narrow strip of the plot which received no superphosphate overlapped a portion of those plots which received superphosphate two years before. The plants on this portion grew considerably better than on the remainder of the plot, thus showing the valuable residual effect of the superphosphate applied two years earlier.

There was very little difference between the three heavy dressings at any time during the season, growth and general appearance being excellent. The light dressing (75 lbs.) was much inferior, and showed the effects of the cold conditions.

At maturity the two heaviest dressings were about equal in appearance, and were very slightly better than the 150 lb. dressing.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

No. 1 SECTION.

Planted on 1st May, 1931. Variety—Nabawa. Seed—45lb. per acre.

Rate of Application of Superphosphate per Acre.	Computed Yields per Acre.					Average Yields per acre, 1931.	Per-centage Yields, 1931.	Average Yields per acre, 1929-31.	Per-centage Yields, 1929-31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
225lbs.	21 52	22 32	23 4	23 36	23 28	22 54	111	15 53	107
150lbs.	19 36	20 32	20 24	20 48	21 36	20 35	100	14 48	100
300lbs.	22 48	22 56	23 28	24 16	24 24	23 34	115	16 12	109

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

No. 2 Section.

Planted on 7th May, 1931. Variety—Nabawa. Seed—45lb. per acre.

Rate of Application of Superphosphate per Acre.	Computed Yields per Acre.					Average Yields per acre. 1931.	Per-centage Yields, 1931.	Average Yields per acre, 1929-31.	Per-centage Yields, 1929-31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
No Super	...	...	...	...	...	...	...	...	...
150lb.	16 8	13 44	14 0	17 20	17 36	15 46	100	13 13	100
75lb.	9 36	10 32	9 52	10 40	12 8	10 34	67	9 39	73

This year's results again show that although it is advantageous to apply considerably more than 75 lb. of superphosphate per acre on this class of land, it is not profitable, due to the prevailing price of wheat, to exceed an application of 120 lb. per acre.

Rhenania Phosphate Experiment.

Rhenania phosphate is a superphosphate fertiliser manufactured by the Kali-Chemie Company, Berlin, Germany. It is a high grade ammonium citrate soluble fertiliser, containing 28·4 per cent ammonium citrate soluble phosphoric acid, and has given satisfactory results in Germany. It has also proved valuable for rice culture in Japan and there is a considerable export to that country and also to Brazil, Chili, Guatemala, etc.

Owing to the generosity of the manufacturers, a quantity of this fertiliser was made available for trials in this State. The cost of this fertiliser in Germany is £5 3s 9d. per 1,000 kilograms.

A portion of this fertiliser was made available to this Branch for trials with wheat, and experiments were laid down at both the Merredin Experiment Farm and the Wongan Hills Light Lands Farm.

Plot 1—Received an application of 150 lbs. of Rhenania phosphate per acre.

Plot 2—Received an application of 150 lb. of superphosphate per acre (control plot).

Plot 3—Received an application of 170 lb. of Rhenania phosphate per acre.

Plots 1 and 2 thus received the same weight of fertiliser per acre, and Plots 2 and 3 the equivalent quantities of phosphoric acid.

The plots, which were each one-eighth of an acre in area, were repeated five times, the fertiliser being applied with the seed at the time of planting, and the resulting crop was harvested for grain.

Germination was about equal on all plots, but as the season advanced, the plots which received a dressing of Rhenania phosphate gradually fell behind the controls in general appearance, and also showed the effects of the cold conditions. They made less growth and matured a few days later than the controls. The difference between them and the controls, however, was not nearly so marked as was the case last year. This year's experiment was conducted on land which had previously been cropped and therefore received the benefit of the residual effect of superphosphate which is considerable.

RHENANIA PHOSPHATE EXPERIMENT.

Planted on 7th May, 1931. Variety—Nabawa. Seed—45lb. per acre.

Rate of Application of Phosphates per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.	Percentage Yields, 1931.	Average Yields per acre, 1930–31	Percentage Yields, 1930–31
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
	bus. lbs.		bus. lbs.		bus. lbs.		bus. lbs.		bus. lbs.		bus. lbs.	%	bus. lbs.	%
150lbs. Rhenania Phosphate	18	24	18	16	17	28	14	40	11	4	15	58	82	12 45	69
150lbs. Superphosphate	23	36	21	36	20	40	17	36	13	44	19	26	100	18 22	100
170lbs. Rhenania Phosphate	17	44	16	48	15	4	11	4	10	48	14	18	74	11 22	62

The results confirm last year's, viz., Rhenania Phosphate is not likely to displace superphosphate as a phosphatic fertiliser for the wheat crop.

Potash Experiment.

The object of this experiment is to determine whether any advantage is derived by supplementing the dressing of superphosphate with a potassic manure for growing a wheat crop on light land.

Three fertilisers were used, and were applied as follows:—

Plot 1—150 lb. superphosphate plus 56 lb. muriate of potash per acre.
Plot 2—150 lb. superphosphate per acre (control).
Plot 3—150 lb. superphosphate plus 140 lb. kainit per acre.

This section of plots, each one-eighth of an acre, was repeated five times. The quantity of potash stated as K_2O is the same in 56 lb. of the muriate as in 140 lb. of the kainit.

The potassic fertilisers were applied to the respective plots about four weeks before seeding. This course is considered advisable owing to the risk of injuring the young plants incurred by applying a fertiliser of this type at seeding time.

Germination was good and growth throughout the season was robust and healthy. At no time during the season could any difference be discerned between the plots.

MIXED FERTILISER EXPERIMENT.

Planted on 1st May, 1931. Superphosphate—150lb. per Acre. Seed—45lbs. per Acre. Variety—Nabawa.

Potash Applied per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931		Percentage Yields, 1931.	Average Yields per acre, 1927-31.		Percentage Yields, 1927-31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
Muriate of Potash, 56lbs.	19	4	15	12	19	36	17	44	16	56	17	42	97	15	46	98
No Potash	19	4	19	44	19	20	16	56	16	16	18	16	100	16	0	100
Kainit, 140lbs. ...	18	0	19	4	18	48	16	24	16	24	17	44	97	15	54	99

The results of this year and also the average results for the five years during which the experiment was conducted, show that the yields are not increased by applying a potassic fertiliser to this class of soil.

Nitrogen Experiment.

The objects of this experiment which was carried out on fallowed and unfallowed land are:—

(a) To determine whether increased yields are obtained when heavy dressings of sulphate of ammonia are applied to the wheat crop in addition to an application of superphosphate, and

(b) To ascertain whether it is advantageous to apply only part of this nitrogenous fertiliser at seeding time and part during the month of August (spring).

For the purposes of the experiment, two rates of sulphate of ammonia were applied, viz., 1 cwt. and 2 cwts. respectively.

Superphosphate was applied to all plots at the rate of 150 lb. per acre, and those plots to which superphosphate only was applied were treated as controls. Comparisons were made between these control plots and those plots receiving 1 cwt. and 2 cwt. of sulphate of ammonia per acre respectively. With each of these dressings the whole of the fertiliser was applied at the one time, viz., at seeding in the one instance, and also, in separate plots, the application of half of the sulphate was delayed until the month of August.

NITROGEN EXPERIMENT.

FALLOW—SECTION NO. 1.

Planted on 8th May, 1931. Superphosphate—150lbs. per Acre. Seed—45lbs. per Acre. Variety—Nabawa.

Rate of Application of Sulphate of Ammonia per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1929–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
½ cwt. at Seeding; ½ cwt. in August	26	8	26	0	25	36	25	52	25	52	25	54	140	135
Nil	18	32	18	8	18	0	18	32	19	4	18	27	100	100
1 cwt. at Seeding; 1 cwt. in August	25	28	26	8	26	16	25	36	26	24	25	58	141	142

FALLOW—SECTION NO. 2.

Planted on 8th May, 1931. Superphosphate—150lbs. per Acre. Seed—45lbs. per Acre. Variety—Nabawa.

Rate of Application of Sulphate of Ammonia per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1929–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
1 cwt. at Seeding	22	40	23	28	22	48	22	56	*		22	58	111	130
Nil	20	24	20	32	19	52	20	24	22	0	20	38	100	100
2 cwt. at Seeding	25	4	26	0	25	20	26	16	25	12	25	34	124	135

* Mishap during harvesting.

NON-FALLOW—SECTION NO. 1.

Planted on 22nd May, 1931. Variety—Gluyas Early. Seed—45lbs. per acre. Superphosphate—150lbs. per acre.

Rate of Application of Sulphate of Ammonia per acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1929–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
½ cwt. at Seeding; ½ cwt. in August	17	36	17	44	17	44	19	4	17	28	17	55	124	119
Nil	13	28	13	52	14	48	14	24	15	28	14	24	100	100
1 cwt. at Seeding; 1 cwt. in August	22	0	21	52	22	32	22	8	23	44	22	27	156	127

NON-FALLOW—SECTION NO. 2.

Planted on 22nd May, 1931. Variety—Gluyas Early. Superphosphate—150lbs. per acre. Seed—45lbs. per acre.

Rate of Application of Sulphate of Ammonia per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Average centage Yields, 1929–31.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
	bus.	lb.	bus.	lbs.	bus.	lbs.	bus.	lbs	bus.	lbs.	bus.	lbs.	%	%
1cwt. at Seeding	20	0	20	24	20	24	17	52	19	4	19	33	135	119
Nil	16	32	15	36	13	28	13	4	13	36	14	27	100	100
2 cwt. at Seeding	24	8	23	44	23	20	22	24	23	12	23	22	162	127

The results from the fallowed sections of the experiment show that a dressing of nitrogenous fertiliser when applied at seeding time gives greater yields than when portion is applied at seeding and the balance during spring.

They also demonstrate that this class of soil is very deficient in nitrogen.

This year's results indicate that further increased yields are obtained by applying even more than 1 cwt. and up to 2 cwt. of sulphate of ammonia per acre, but this is not confirmed by previous years' results.

Manganese Experiment.

The object of this experiment is to determine whether increased wheat yields are obtained by applying a manganese fertiliser to the wheat crop. Manganese sulphate was applied at two rates, viz., 26 and 52 lb. respectively, the plots being manured as follows:—

Plot 1—150 lb. superphosphate plus 26 lb. manganese sulphate per acre.
Plot 2—150 lb. superphosphate per acre (control).
Plot 3—150 lb. superphosphate plus 52 lb. manganese sulphate per acre.

The results obtained are shown below:—

MANGANESE EXPERIMENT.

Planted on May 18th, 1931. Superphosphate—130-139 lbs. per acre.
Variety—Nabawa. Seed—45lbs. per acre.

Quantity of Manganese Sulphate per Acre.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
26lbs.	19	28	18	32	17	52	16	8	16	56	17	47	109
Nil (Control)	17	28	17	44	15	36	16	0	15	4	16	22	100
52lbs.	19	20	18	40	16	48	16	48	17	28	17	49	109

These results, which are for one year only, show a slight increase in yield by applying manganese sulphate. Similar experiments at the other experiment farms, however, do not indicate that any substantial increase in yield would result from the application of a manganese fertiliser. The value of the increased yield obtained at the Wongan Hills Farm would be far below the value of the applied manganese sulphate.

Seasonal Planting Experiment.

The objects of the experiment are:—

1. To ascertain the most suitable month to plant the late, midseason, and early maturing varieties of wheat.
2. To determine the most prolific of each of the above types.

To meet the requirements of the experiment, three sections were planted, viz.:—

(a) Section 1, planted in April, representing early planting.
(b) Section 2, planted in May, representing midseason planting.
(c) Section 3, planted in June, representing late planting.

Each section, planted in its respective month, was repeated five times, all plots being eventually harvested for grain.

SEASONAL PLANTING EXPERIMENT.

APRIL PLANTING.

Planted on 17th April, 1931. Superphosphate—150lbs. per acre. Seed—45lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields, 1928–31.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
Yandilla King ...	Late... ...	18	16	17	20	17	20	17	44	17	4	17	33	114	103
Nabawa ...	Midseason ...	15	28	15	4	15	4	16	8	15	4	15	22	100	100
Sutton	Late... ...	18	0	18	0	17	44	18	8	17	52	17	57	117	*
Bencubbin ...	Midseason ...	18	40	18	8	18	0	19	4	18	32	18	29	120	125†
Nabawa ...	Midseason ...	15	36	15	4	15	28	15	36	15	28	15	26	100	100
Gluyas Early ...	Early ...	14	56	14	24	14	48	14	24	14	24	14	35	94	95

* Planted 1931 only. † Planted 1930–31.

SEASONAL PLANTING EXPERIMENT.

MAY PLANTING.

Planted on 15th to 16th May, 1931. Superphosphate—150lbs. per Acre. Seed—45lbs. per Acre.

Variety.	Maturity.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields. 1928–31.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
Yandilla King ...	Late ...	17	36	13	52	15	12	15	44	14	56	15	28	98	92
Nabawa ...	Midseason ...	19	4	13	36	15	28	14	56	15	44	15	46	100	100
Sutton	Late ...	18	24	13	20	13	36	13	52	14	56	14	50	94	*
Bencubbin ...	Midseason ...	16	24	17	20	16	24	16	40	17	4	16	46	107	114†
Nabawa ...	Midseason ...	17	20	15	44	14	40	15	4	15	44	15	42	100	100
Gluyas Early ...	Early ...	15	4	15	4	13	52	14	24	14	48	14	38	93	103
Merredin ...	Early ...	15	4	14	32	14	8	14	56	14	40	14	40	84	88
Nabawa ...	Midseason ...	17	36	17	20	16	56	17	28	17	52	17	27	100	100
Carrabin ...	Early ...	14	32	15	12	15	36	16	24	...		15	26	89	97
S.H.J.	Early ...	13	20	14	32	14	32	15	4	13	28	14	11	86	86
Nabawa ...	Midseason ...	14	24	16	48	17	4	18	32	15	52	16	32	100	100
Geeralying ...	Very Early	12	0	13	36	15	12	15	20	12	8	13	39	83	80
Nabawa ...	Midseason ...	13	20	16	40	16	24	17	44	14	56	15	49	100	100
Noongaar ...	Very Early	7	44	8	8	8	8	9	44	7	44	8	18	52	61

* 1930 31 only. † 1931 only.

SEASONAL PLANTING EXPERIMENT.

JUNE PLANTING.

Planted on 15th to 16th June, 1931. Superphosphate—150lbs. per Acre. Seed—45lbs. per Acre.

Variety.	Maturity.	Computed Yields per Acre.										Average Yields per acre, 1931.		Percentage Yields, 1931.	Percentage Yields. 1928–31.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
Geeralying ...	Very Early	6	48	8	40	12	0	12	56	13	56	10	48	76	81*
Nabawa ...	Midseason ...	9	44	12	16	15	12	16	0	17	36	14	10	100	100
Bencubbin ...	Midseason ...	10	24	13	4	18	0	18	40	19	44	15	58	113	117†
Carrabin ...	Early ...	7	36	10	32	12	48	14	48	14	48	12	6	79	87
Nabawa ...	Midseason ...	9	52	15	20	15	52	18	0	17	44	15	22	100	100
Gluyas Early ...	Early ...	9	4	14	40	14	8	15	12	16	48	13	58	91	91
Merredin ...	Early ...	8	16	14	0	13	36	14	56	15	12	13	12	81	86*
Nabawa ...	Midseason ...	10	48	17	20	16	8	18	0	18	48	16	13	100	100
S.H.J. ...	Early ...	8	0	13	20	13	12	14	24	15	12	12	50	79	81
Nabawa ...	Midseason ...	11	20	17	12	17	44	17	44	17	52	16	22	100	100
Noongaar ...	Very Early...	7	28	11	44	12	48	13	12	11	28	11	20	69	72

* 1929–31. † 1930–31.

In all three sections the midseason variety, Bencubbin, shows to considerable advantage. The late varieties, Yandilla King and Sutton, have also yielded well in the early planted section.

The experiment indicates the advantage of early planting on this class of soil.

Oat Variety Trial.

In former years this experiment consisted of eight sections, three of which were cut for hay and the remaining five harvested for grain. This year, however, all of the eight sections were harvested for grain.

The results are shown hereunder:—

WONGAN HILLS LIGHT LANDS FARM.

OAT VARIETY TRIAL.

Planted on 21st and 22nd May, 1931. Superphosphate—150lbs. per acre. Seed—40lb. per acre.

Variety.	Maturity.	Computed Yields per Acre.								Average Yields per acre, 1931.	Percentage Yields, 1931.	Percentage Yields, 1926–31.
		Section 1.	Section 2.	Section 3.	Section 4.	Section 5.	Section 6.	Section 7.	Section 8.			
		bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
Mulga	Early	14 24	10 24	11 8	9 8	13 24	13 24	13 32	16 0	12 33	98	96
Burt's Early	Early	13 24	8 16	11 16	12 16	13 16	14 24	15 16	15 16	13 3	100	100
Belar	Midseason	11 0	9 32	11 0	13 0	14 0	15 24	16 16	16 8	13 15	102	98
Burt's Early	Early	12 24	9 32	11 32	11 24	12 16	13 24	15 32	17 24	13 6	100	100
Burt's Early	Early	12 8	9 8	10 32	11 24	13 16	14 24	16 16	17 24	13 9	100	100
Algerian	Late	10 32	9 32	13 24	14 16	15 16	15 32	17 32	18 24	14 21	110	118
Guyra	Midseason	10 32	9 24	14 16	13 32	14 0	14 24	16 8	19 16	14 4	105	107
Burt's Early	Early	11 0	10 8	13 8	11 16	13 8	14 0	16 24	17 24	13 16	100	100
Burt's Early	Early	10 32	10 8	12 16	10 8	12 24	14 16	17 0	15 16	12 35	100	100
Lachlan	Midseason	12 16	12 8	14 24	16 24	16 24	17 8	18 24	11 32	15 0	117	108
Gidgee	Midseason	10 24	10 32	8 24	10 32	12 8	13 8	15 0	14 8	11 37	90	86
Burt's Early	Early	9 32	11 16	11 24	13 32	14 0	14 8	16 8	14 24	13 8	100	100
Burt's Early	Early	9 32	10 32	10 32	12 24	13 0	14 32	16 0	12 16	12 21	100	100
Palestine	Early	6 32	7 0	7 24	7 0	7 16	8 16	11 24	7 0	7 34	63	101

The late and midseason maturing varieties of oats have shown to best advantage in these trials. However, with the exception of the early variety, Palestine, there is not a great deal of difference between the yields of any of the varieties planted in the trial.

RATE OF SEEDING EXPERIMENT—OATS.

As was the case for the similar experiment with wheat, this was planted with both a free and a sparse stooling variety, and the land also was prepared identically with that for the wheat experiment.

Burt's Early.—Germination was good, and growth was steady throughout the season. Although the light sowing appeared somewhat thin, there was little difference between the two heavier rates. A certain amount of black flag occurred, more particularly on the gravelly soil. At maturity the light sowing was not so dense as the heavier rates, but was very slightly taller.

Algerian.—Both germination and stooling were good. Growth was slow until September when rapid growth was made. A certain amount of black flag occurred, more particularly on the gravelly soil, but was not so marked as in the Burt's Early. The light sowing appeared somewhat thin throughout the season and at maturity did not show to advantage alongside the heavier rates.

RATE OF SEEDING EXPERIMENT—OATS.

Planted on 19th May, 1931. Variety—Burt's Early. Superphosphate—150lb. per acre.

Rate of Seed per acre.	Computed Yields per Acre.					Average Yields per Acre, 1931.	Percentage Yields, 1931.	Average Yields per Acre, 1926–31.	Percentage Yields, 1926–31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
45lb.	10 32	13 8	14 0	15 0	14 8	13 18	107	14 1	102
30lb.	11 24	12 16	13 0	14 0	12 0	12 24	100	13 29	100
60lb.	12 0	14 8	14 32	15 24	14 32	14 11	113	14 17	105

RATE OF SEEDING EXPERIMENT—OATS.

Planted on 19th May, 1931. Variety—Algerian. Superphosphate—150lb. per acre.

Rate of Seed per acre.	Computed Yields per Acre.					Average Yields per Acre, 1931.	Percentage Yields, 1931.	Average Yields per Acre, 1926–31.	Percentage Yields, 1926–31.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
45lb.	18 32	20 0	18 32	20 0	19 8	19 14	103	14 12	109
30lb.	19 0	20 16	17 8	17 24	19 32	18 32	100	13 3	100
60lb.	20 32	22 24	19 16	20 32	20 0	20 29	110	14 24	112

With the sparse stooling variety, this year's results would indicate that yields are increased by the heavier rates of seeding, but the average results of the past six years indicate that no economical advantage is gained by sowing the heavier rates of seed.

With the free stooling variety both this year's results and the average for the past six years show that the yields are increased to advantage when the heavier rates of seeding are applied. This is the reverse of what may have been expected and may be due to the sparse stooling variety containing a greater number of seeds per bushel than the freer stooling one which has larger and heavier grain.

DOWNY MILDEW (so-called "Blue Mould") OF TOBACCO.

Found occurring naturally on Wild Tobacco (*Nicotiana suaveolens*) in the Wheat Belt.

PRECAUTIONS NECESSARY DURING THE FORTHCOMING SEASON.

H. A. Pittman, B.Sc.Agr., Plant Pathologist.

As previously reported in this Journal by the writer (Vol. 7, 2nd Series, No. 3, pp. 469-476, September, 1930), the first outbreak of the "Downy Mildew" (so-called "Blue Mould") disease of tobacco in this State was recorded on the 14th August, 1930, on tobacco seedlings grown in the South-West at Manjimup. A hurried visit on that occasion to the district by Mr. A. R. C. Clifton, who is in charge of the tobacco investigations in this State, and the writer, revealed that the disease had apparently been present in a mild form unrecognised for several years, having presumably been introduced in the first place by infected seed.

In an attempt to make quite sure that their tobacco seedlings would not be infected with the disease during the 1931-32 season, the growers on whose properties the "Downy Mildew" had appeared the previous season made private arrangements, unknown at the time to the writer, to have their tobacco seedlings raised at Doodlakine in the early zone of the wheat belt, 205 miles in a direct line from Manjimup and about 120 miles in a straight line East and slightly North of Perth. The average annual rainfall is about 13 inches, most

Fig. 1. *a.* (*left*). A young tobacco plant infected with "downy mildew" (blue mould"). Note the shrivelling of the leaves indicated by the arrows.
b. (*right*). Portion of the underneath side of a young leaf infected with "downy mildew" ("blue mould"). Note the whitish, downy, growth of the fruiting bodies of the causal fungus, *Peronospora sp.* (magnified). *After N.S. Wales Dept. of Agriculture.*

of which falls in the period from April to October. It was considered by the growers that the fungus causing the disease (*Peronospora sp.*) could surely not be encountered there.

All the seed planted had been disinfected in absolute alcohol for six minutes by officers of this Department, and was taken from the same bulk of disinfected seed as was being drawn on to supply other settlers in the South-

West, none of whom had any signs of "Downy Mildew" in their seedlings or grown plants, so far as is known, during the whole of the season.

On the 15th October, 1931, Mr. Clifton was advised by an interested party that tobacco seedlings which were being sent down to Manjimup from Doodlakine appeared to be affected with "Blue Mould." Mr. Clifton and the writer therefore proceeded to Doodlakine immediately, and found (16th October) that the greater part of one acre of seed beds ("Hickory Prior," "White Stemmed Orinoco," and "Adcock") was exceedingly seriously affected with "Downy Mildew" (*Peronospora sp.*). Searching over the granite outcrops of the district on the following morning, we were able to find large numbers of wild tobacco plants (*Nicotiana suaveolens*), many of which showed the typical whitish patches and fruiting bodies (*conidiophores*) of the *Peronospora* on the lower surfaces of the leaves.

The time at our disposal while waiting for the train was only limited, as it seemed imperative to get down to Manjimup as soon as possible to investigate the situation there and prevent, if possible, an epidemic (*epiphytotic*) of the disease in the South-West. Wild tobacco plants as far away, however, as eight miles from the infected seed beds were examined and found to be carrying the conidiophores of a *Peronospora* which appears to be identical with that on cultivated tobacco. As all of the seed planted in the seed beds at Doodlakine was disinfected in absolute alcohol in the usual way and was from the same bulk as supplied to many other growers in the South-West, none of whom had any losses, so far as is known, from "Blue Mould," it appears pretty clear that the infection on the seed beds at Doodlakine was picked up from the naturally-infected wild tobacco in the district. The seed beds were not fired or disinfected before planting, and some wild tobacco seedlings were actually found growing in the seed beds with the cultivated species.

Fig. 2.—Adult tobacco leaf showing holes in places previously attacked by "downy mildew" ("blue mould") due to *Peronospora sp. After N.S. Wales Dept. of Agriculture.*

Assisted by the very hot, dry weather at Manjimup, we were able to get the disease under control, although the infected seedlings had been planted out on four properties for about a fortnight before we were advised of the occurrence of the disease in the Doodlakine seedlings. Incidentally, it may be mentioned that seedlings being raised at the time on the infected properties at Manjimup were prevented from becoming diseased by having the growers, *inter alia*, spray the seedlings at frequent intervals with Bordeaux mixture and keep the waterings down to the irreducible minimum, while at the same time giving the maximum possible exposure to sunlight and keeping the temperatures up as much as possible at nights.

On the 16th December, Dr. L. J. H. Teakle, Plant Nutrition Officer, brought to my office in Perth a parcel of wild tobacco plants (*Nicotiana suaveolens* var. *major*) which had been collected quite *at random* at Knunjagin in the wheat belt, 20 miles or so North of Merredin and about 35 miles in a direct line North-East of Doodlakine, where the nearest cultivated tobacco had been growing. These plants had not been examined at all in the field for the presence of disease, yet the very first leaf examined in the laboratory was found to be carrying the conidiophores of the *Peronospora*. There is little doubt that a thorough survey of the wild tobacco situation in the wheat belt would reveal the disease to be widespread in our drier wheat belt areas.

Indeed, it is beginning to look very much as if the causal fungus of the "Blue Mould" disease of cultivated tobacco in Australia is indigenous to the Commonwealth, as has been suspected in scientific circles for some time. This would explain why the disease has been such a menace to the Australian tobacco-growing industry right from its inception, although apparently of little, if any, consequence elsewhere.

PRECAUTIONS TO BE TAKEN IN FUTURE TO PREVENT THE DEVELOPMENT OF "DOWNY MILDEW" ("BLUE MOULD") OF TOBACCO.

The writer firmly believes that "Downy Mildew" ("Blue Mould") of tobacco can be prevented, or at least "controlled" in Western Australia, provided that the proper precautions, as indicated below, are taken.

In this connection no single measure can be relied on for success. Control of such a serious pest as the "Blue Mould" can only be achieved by the intelligent combination of a series of interdependent practices. These may be stated as follows:—

1. Under no circumstances should growers attempt to escape the ravages of "Downy Mildew" ("Blue Mould") simply by having tobacco seedlings raised in the wheat belt. To do so, from what has been said above, is obviously to court disaster, not to escape it, owing to the widespread distribution of wild tobacco in the wheat belt and the fact that, at least in certain areas, the wild tobacco is naturally infected with the disease.

2. At the conclusion of the harvesting operations for the season, *i.e.*, when all the seed or leaf has been gathered, every tobacco plant on the property should be destroyed, in order to prevent carrying the fungus over from year to year on over-wintering plants. The best method of destruction would be to pull up the remains of the plants by the roots and burn them, but, if the same field is not to be used again for several years for tobacco-growing, there would be no objection to ploughing the plants under, provided that a mouldboard plough which will completely bury the tissues is used and that any suckers which may happen to grow up are systematically destroyed as soon as noticeable above the ground. Tobacco growers should regard tobacco plants growing on their properties at any other times than when being deliberately grown for seed or leaf as their worst possible enemies, from the point of view of insect and disease dissemination.

Ministerial approval under the Plant Diseases Act, 1914-25, *has been obtained to enable the above operation to be rigorously enforced by the end of June at the very latest.*

3. The seed beds should be placed in a new position each year, and should be as far as possible removed from curing-barns or places in which tobacco is stored, or fields which have previously grown tobacco.

4. The seed beds should be *sterilised* in one or other of the following ways:—

(a) by the use of steam at 100 lbs. pressure for half an hour by means of the "inverted pan" system; or

(b) by the use of a strong wood fire on the site of the seed bed for at least four hours. (The heat should be sufficient to cook a 4oz. potato buried three inches deep in the soil, or an egg buried five inches deep)*; or

(c) by thoroughly loosening the soil of the seed bed with a spade, etc., and then watering with *formalin solution* made up at the rate of one gallon of commercial formalin to every fifty gallons of water, using half to one and a half gallons of the made-up solution to every square foot of soil. Formalin-moistened bags, or the glass frames or linen covers after being watered with, or dipped in, the formalin solution, should be put on the beds for two days following treatment to hold in the fumes, then removed and the beds stirred and allowed to air for at least 10 days before sowing the seed. When stirring the beds to let out the formalin fumes, after the first two days, or to make a suitable surface on the bed to receive the seed at the completion of the treatment, use a rake or shovel, etc., previously sterilised with steam, fire or formalin.

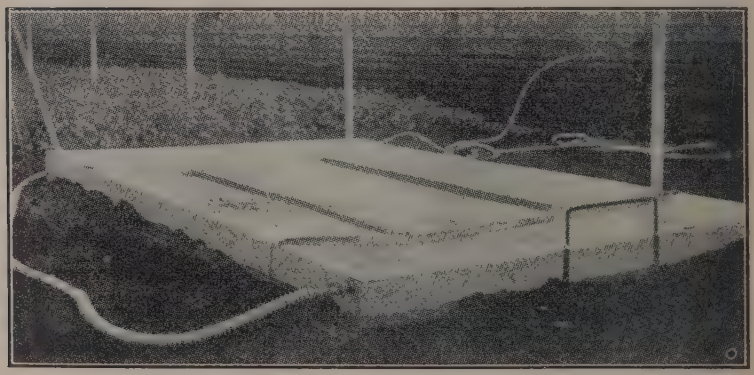


Fig. 3.—Showing a method of sterilising soil by steam, using the "inverted pan" system. Note the flexible steampipe entering the heavy-gauge galvanised iron pan at the front left corner. Note also the handle at the front for lifting the pan from one site to another. The rear handle is hardly obvious in the photograph.—*After Chupp, "Manual of Vegetable Garden Diseases."*

5. All seed sown should be soaked before sowing in absolute alcohol for five minutes to destroy any infection possibly being carried by the seed.

The Department has undertaken to treat all tobacco seed at a cost of one shilling per ounce or part thereof, and, under the Plant Diseases Act, 1914, the sale or distribution of tobacco seed within the State has been prohibited, unless,

* N. A. R. Pollock, "Tobacco Seed Beds," Queensland Agric. Journal," Vol. 34, Part 4, pp. 408-412, October, 1930.

and until, the seed has first been disinfected under the supervision of an Inspector under the Act. Under the same Act steps have been taken to have the importation of tobacco seed from other States or Overseas prohibited except for Departmental purposes (see *Government Gazette,* 24th October, 1930). The penalty for disregarding any regulation under the Act is £25.

Disinfection of the seed in absolute alcohol has recently been shown by Angell (Journ. C.S.I.R., Australia, Vol. 2, pp. 150-160, 1929) to be very effective, and this treatment must be considered henceforth a routine practice in tobacco culture. (Departmental experiments have shown that the germination of the seed is not detrimentally affected by as long an immersion as six and one half minutes in absolute alcohol, if the seed is spread out thinly and dried on clean blotting paper, with frequent turning to hasten the evaporation of the alcohol, as quickly as possible following treatment.)

6. Seeing that the "Downy Mildew" or "Blue Mould" is greatly encouraged by abundance of moisture, every precaution should be taken to keep the surface of the seed bed as *dry* as possible after the seeds have germinated. Every effort should be made to reduce the surface waterings to an absolute minimum, or even to eliminate them altogether. This may be done by making the soil very firm during the preparation of the seed bed so that water will readily flow to the roots by capillarity, or by watering, as in the "Marks" system (Report from Select Committee on the Tobacco-growing Industry in Australia, Government Printer, Canberra, 1930), from a trough running along the back of the seed bed with perforated pipes at right angles carrying the water several inches below the surface of the soil.

Overhead watering, if used, should only be carried out in the mornings, never at night, so that the moisture will soon be dried off the leaves by evaporation. The "Downy Mildew" fungus enters the leaves through moisture at night, or during dull, muggy weather; hence the importance of always keeping the above-ground parts of the plants as dry as possible.

Seed beds should be so built as to lie broadside-on to the morning sun. As soon as the seeds have germinated they could be lightly covered with sterilised white sand, and a little of the sterilised sand could be sprinkled on the bed from time to time as the seedlings grew older. The sand could be sterilised by the use of formalin as described under 4 (c) above, or by heating in shallow tins in an oven for several hours, and it could then be stored in sterilised kerosene tins until required.

7. The glass frames, or the linen or hessian covers to the seed beds, should be removed every bright, dry, sunny day so as to cause hardening-up of the seedlings and prevent the steamy conditions so favourable to the "Downy Mildew."

8. The plants should be well thinned out in the seed bed, so that each plant will receive plenty of sunlight and have a good circulation of air around it. Wide spacing of the seedlings avoids the moist, muggy conditions and the soft sappy growth so favourable to the disease.

9. If possible, some source of heat should be provided for the seed beds at night, and during cold days, so as to prevent the temperatures dropping below 45 deg. F., as the development of the fruiting-bodies of the fungus (and consequently its rapid spread) seems to be greatly favoured by low temperatures following warm, muggy, conditions just previously. Some growers make use of a fire with a straight-through or return flue beneath the bed to keep up the temperatures, while others use a kerosene or petrol lamp outside one end of the bed to heat a pipe running through the frames above the seedlings. This would seem to be the best type, as tending to lower the humidity of the air

above the bed quite considerably, but care must be taken to see that the apparatus cannot get too hot. Moreover, if this method is used, the covers to the seed beds must be erected considerably further above the surface of the beds than is common practice at the present time.

In "The Farmers' Handbook," 5th Edition, published in 1929 by the New South Wales Department of Agriculture, it is stated, "**Experiments conducted by the Department during the last few years indicate that if the temperature of the seedlings is not allowed to fall below 45 deg. F., and the surrounding air is not allowed to become humid, "Blue Mould" does not make its appearance.**

10. Seed beds should be made long and narrow, and not short and broad. About a yard wide should be ample. This type of construction greatly facilitates the work of weeding, transplanting, etc., and there is not nearly so much chance of spreading infection mechanically during inspection of the seedlings.

11. As a precautionary preventive measure the seedlings in the seed beds should be sprayed at five to seven-day intervals with a 3-5-50 Bordeaux Mixture; a very fine mist being used so as to leave only a thin film of spray on the leaves when the liquid has dried down. The spraying should commence as soon as the tiny plants reach the four-leaf stage. Commercial ready-made Bordeaux or Burgundy mixtures can be used instead of the home-made Bordeaux, at the rate of one quarter pound (¼ lb.) to every two and one half gallons of water (2½ gallons). Any of these sprays can be conveniently applied to the seedlings in the seed bed with a knapsack sprayer. Spraying should not be done during the heat of the day or when the plants are drooping. Early in the morning, after the dew has dried off the plants, but before the sun has become too hot, or an hour or so before sun-down in fine, warm, quick-drying weather would be satisfactory.

Leaflet No. 314 on the preparation of Bordeaux Mixture can be obtained without charge upon application to the Department of Agriculture. A full account of the preparation of this excellent fungicide can also be found in the December, 1930, issue of this Journal. Growers should follow the directions very closely, and should be particularly careful only to use the very best freshly burnt or quick lime. Air-slaked lime is useless for the preparation of Bordeaux Mixture. A rough but useful test which should always be made after the Bordeaux Mixture has been prepared, and before spraying the plants with it, is to dip the clean blade of a penknife or a bright piece of iron, such as a shiny nail, into the mixture for several minutes. If the mixture does not contain enough lime, a reddish-brown deposit of copper will form on the iron and more quick lime should be added, until, on further testing with a fresh knife blade or shiny nail, no stain is obtained. If this test is always carried out before spraying with the Bordeaux Mixture, there need be no fear of burning the plants with the spray.

12. Seed beds should be planted as *late* as possible in the spring, as the lower the atmospheric humidity during the growth of the seedlings and following transplanting the less is the danger of loss from "Downy Mildew." Considerably more seedlings should be raised than are actually required for planting out, and a succession of sowings in different seed beds at weekly or fortnightly intervals may be of considerable value in ensuring that some at least will come through to planting-out time unscathed.

13. If possible, tobacco should not be grown more frequently than, say, once in three years on the same paddocks, as the fungus, in the resting-spore (*oospore*) stage, can apparently remain alive in the soil for a long period.

14. In the event of "Downy Mildew" breaking out in the field, the plants should be sprayed with Bordeaux Mixture 3-3-50 plus ½ lb. calcium caseinate to every 50 gallons of spray, taking great care to see that the bottom sides of the leaves are thoroughly sprayed. (Preparation of Bordeaux Mixture is fully described in Leaflet No. 314, available, free of charge, on application.) Instead of spraying, the plants could be dusted with a recognised copper carbonate-sulphur or copper sulphate-lime dust, although spraying will be found more effective than dusting.

15. Should any plants in the seed beds become affected with "Downy Mildew," they, and the immediately-surrounding plants, should be destroyed *before removing* from the bed by watering with a little strong bluestone solution made up at the rate of 1 lb. to 1 gallon of water. After the plants are dead, or thoroughly wet with the bluestone on the bottom sides of the leaves, they should be removed and burned, or deeply buried.

16. All precautions should be taken to keep down insect pests, as these are very liable to carry infection into the bed from neighbouring farms or from plant to plant in the beds. Angell (Journ. C.S.I.R., Australia, Vol. 3, pp. 83-86, 1930) has recently shown that the "potato moth" or "tobacco leaf miner" (*Phthorimaea operculella*, Zell.) can readily carry infection, and the same undoubtedly applies to other insects such as the "lucerne flea" (*Smynthurus viridis*, Linn.) or the "red legged earth mite" (*Penthaleus destructor*, Jack.), etc.

A space free of all vegetation should be left for several yards around the tobacco beds, as this will act as a good break to the lucerne flea, mite, and other similar walking or hopping insects.

17. Growers should refrain from visiting other growers' seed beds, as one careless human might carry considerably greater numbers of fungus seeds (*spores*), and for much greater distances, than many insects.

18. All "native tobacco" plants (*Nicotiana suaveolens*) or other wild tobacco species on a tobacco plantation, or in a tobacco-growing district, should be periodically destroyed, as they may harbour the "blue mould" fungus.

19. Care should be taken to avoid dropping cigarette-ends or fragments of cut leaf from commercial smoking mixtures, especially if air-cured, on the seed beds or tobacco fields, as it is possible that infection may occasionally be carried in that way.

20. The seedlings should be transplanted into the field *as soon as possible,* as the "Downy Mildew" ("Blue Mould") disease is essentially a seed bed trouble, being favoured in the seed bed by the unnatural crowding of the plants and the somewhat artificial conditions under which they are grown while in the seed bed stage. Little, if any, trouble will be caused by this disease in this State in normal years after planting out.

A full description of the symptoms of "Downy Mildew" ("Blue Mould") of tobacco, together with the life-history of the causal fungus (*Peronospora sp.*), may be found in Leaflet 329, available, free of charge, on application to the Department of Agriculture, or on pages 264-72 of this Journal for June, 1931.

FINAL WORD.

All the above may seem a lot of trouble to go to, but there is no doubt that the successful Australian tobacco-grower of the future will be he who never tires of going to what other people would call trouble, to ensure successful results. The rewards for successful tobacco culture in Australia are great, but nature certainly seems to be doing her best to ensure that the rewards shall not be too easily won. Biological laws are no less immutable, or less certain in their outcome, however, than physical ones, and he who correctly sets the stage in every detail must inevitably reap the reward.

THE APPLE CURCULIO.

ITS CONTROL BY A POISON BAIT.

J.M.R

By H. G. Andrewartha, B.Sc. (Agric.). XIX.467.

During the past summer the depredations of the Apple Curculio (*Otiorrhynchus cribricollis*) have been as serious as ever. This pest is rapidly spreading throughout the fruit growing districts. In those orchards in which it is well established (and their number is dangerously on the increase) the damage to the trees has been very severe. The fruit spurs and leaders have been ring-barked, the buds have been eaten, and the foliage has been destroyed. For this reason it behoves those growers whose orchards are infested to take prompt and thorough steps for its control.

Fortunately, as the result of a special investigation by the Entomology Branch of this Department, we are now in a position to recommend a very cheap and efficient measure for its control. This bait which has been evolved during the investigation into the bionomics of this pest is undoubtedly the most efficient and cheapest method yet tried (for other control measures see this *Journal*, March, 1930). The bait consists of Sodium Fluoride (a poisonous white powder) mixed with reject apples which have previously been dried and minced. The formula is—

Dried Apple (minced)—9lbs.

Sodium Fluoride—1lbs.

The bait is spread as a complete ring around the butt of the tree. It is essential to place the bait as close to the butt as possible and to make a complete ring of it. The beetles have thus to crawl over the bait before they ascend the tree, and, in so doing, they eat it and are thereby destroyed.

The *time of application* of the bait is a very important factor in its success, and consequently it cannot be too strongly stressed. The reason for the need of exercising care in the time of applying the bait lies in the peculiar feeding habits of the pest. It feeds during two periods which are separated by a long quiescent spell during which no damage is done. The first spell of feeding commences at the beginning of December and lasts until the first week in January, during which time the trees may suffer very serious defoliation if the weevils are numerous. The quiescent spell lasts all January and for the first half of February. During this time the old scars callouse and no fresh damage is to be observed. The second "burst" of feeding commences about the middle of February and lasts throughout March and April. All this time there is only a short period—the first two or three weeks of December—during which all the weevils are feeding every night. During the later feeding period the feeding is much more prolonged and irregular.

Several conclusions as to the correct time to apply the bait can be drawn from the above brief description of the habits of the Curculio. In the first place, the most vulnerable time in its life is the *first few weeks of December*. At this time the weevils have just emerged from their larval stage and are all feeding ravenously. Consequently *the best time to apply the bait is during the last week of November and not later than the first week of December*. In the second place, it is obvious that no good can come from bait that is applied late in December or during January. *During this time the weevils are hiding below the surface and*

not feeding. Thirdly it follows that if the first baiting is not 100 per cent. effective (and it is hardly likely to be), one can expect to see a renewal of the damage starting about the middle of February. If such damage is observed it will be necessary to make a second application of the bait. The time for the second treatment is the third week in February.

As there are normally no apples available for drying in November, it will be necessary to store the bait in the prepared form. It could very readily and easily be prepared from windfall or reject apples when these are plentiful during the months from February to April. These should be roughly cut up, dried, minced and mixed with the poison as directed above. The bait so prepared can be stored in tins or boxes and will keep in perfect condition through the winter. It is estimated that from 10-15 lbs. of bait will be required for each acre of orchard to be treated. It is necessary to dry 6 lbs. of fresh apple for every 1 lb. of the dried material required. Two applications of the bait will probably be necessary. Consequently the orchardist will need to dry 120-180 lbs. of fresh apples for every acre he proposes to treat. This allows 60-90 lbs for each treatment.

The cost of making and applying 10 lbs of bait is estimated as follows:—

Cost of materials—	
Sodium Fluoride (1 lb.)	2s. 5d.
Dried Apple (9 lbs.)	Nil.
Cost of labour—	
Drying and mincing apple (1 man for 2 hours)	2s. 6d.
Applying bait (1 man for 1 hour)	1s. 3d.
Total	6s. 2d.

Assuming that 15 lbs. are required for 100 trees, the cost on these figures will be about 1d. per tree per dressing. This method is thus far cheaper than any other tried out to date and has the additional advantage of being a very efficient control of the pest.

SUMMARY.

The most effective control of the Apple Curculio is poison baiting.

It is essential that the bait be applied at the right time.

The best time is the last week in November and not later than the first week of December.

It may be necessary to repeat the treatment in the third week of February.

It is quite useless applying the bait during the quiescent spell which lasts from the end of December to the middle of February.

It will be necessary to prepare the bait in the autumn and store it through the winter.

LOCAL CROP COMPETITIONS, 1931.

I. THOMAS, Superintendent of Wheat Farms.

In addition to the 50-acre Crop Competitions conducted by the Royal and District Agricultural Societies, competitions were also conducted by unaffiliated bodies or by agricultural societies who submitted their entries too late for acceptance by the Royal Agricultural Society.

The district agricultural societies of Dalwallinu, Kukerin, and Phillips River each conducted competitions judged according to the Royal Agricultural Society's conditions. The competition conducted by the Karloning Progress Association differed inasmuch that it was not a condition that the crop should necessarily be planted on fallowed land.

In all there were 39 entries, the average yield for all competitors being 21.9 bushels. The average yields for the competitors on fallowed and unfallowed land were as follows:—

Fallowed	.. ..	23.5 bushels
Unfallowed	.. ..	13.5 „

The judges' reports and awards, together with a detailed summary of the cultural details will be found on the following pages.

DALWALLINU AGRICULTURAL SOCIETY.

Judge—I. THOMAS, Superintendent of Wheat Farms.

This Society is located in Zone 2, but the entries were received too late for inclusion in the Zone Competition.

Six crops were submitted for inspection, the awards being as follow:—

DALWALLINU DISTRICT AGRICULTURAL SOCIETY, 1931.

Judge—I. Thomas, Superintendent of Wheat Farms.

Competitor.	Address.	Variety.	Yield. 50 pts.	Freedom from Weeds. 10 pts.	Freedom from Disease. 10 pts.	Freedom from Admixture. 15 pts.	Evenness of Growth. 15 pts.	Total. 100 pts.
Sutcliffe, J. & G.	Damboring ...	Gluclub ...	38	8	8	13	14	81
Locke, F. C. ...	Dalwallinu ...	Merredin ...	31	7	7	13	13	71
Bonner, R. J. ...	Nugadong ...	Gluyas Early	29	7	8	12	14	70
Bradford Bros.	Damboring ...	Gluyas Early	29	8	6	14	13	70
Manuel, J. ...	E. Buntine ...	Ford ...	26	8	8	12	13	67
Owen, G. H. ...	W. Buntine ...	Merredin ...	20	9	9	13	13	64

The rainfalls, as recorded at the Dalwallinu centres, are set out below:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sep.	Oct.	Total.	Nov.	Dec.	Total for year.
Dalwallinu ...	...	142	9	86	285	112	251	191	170	121	1,130	165	25	1,557
E. Buntine ...	...	47	1	77	189	99	136	130	104	53	711	61	64	961
Damboring (Balliddu)	...	15	5	94	234	112	312	195	160	61	1,074	...	38	1,226

The cultural details of the competing crops are summarised below:—

CULTURAL DETAILS.

Competitor.	No. of years cropped.	Timber.	When ploughed	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Seed treatment.	Graded.	Disease.
Sutcliffe, J. G.	? Old land	Salmon gum and gimlet	June-July	Good	Disc	in. 3½	Springtyne cultivated Aug., again in Sept., and again in Oct. Planted with combined cultivator drill	Gluclub	3rd week April	lbs. 38	lbs. 90	Copper carbonate	Yes	Traces Ball Smut, Flag Smut, and Takeall.
Locke, F. C. ...	6	Salmon gum, gimlet and little morrel	June	Good	Mould-board	3½	Springtyne cultivated end Aug. and again Sept. Harrowed after rain in Feb. Planted with combined cultivator drill	Merredin	End April and early May	37	90	Copper carbonate	Yes	Flag Smut and patches Takeall.
Honnor, R. J.	6	Heavy salmon and gimlet	July	Good	Mould-board	4	Springtyne cultivated Sept., and again in Oct. Planted with combined cultivator drill. Fed off with sheep till 3rd week in June	Gluyas Early	1st week in May	45	112	Copper carbonate	Yes	Little Takeall.
Bradford Bros.	? Old land	Salmon gum, little morrel	End June, early July	Good	Disc	3½-4	Springtyne cultivated Sept., and again after rain in Feb. Planted with combined cultivator drill	Gluyas Early	Mid-May ...	45-50	90	Copper carbonate	Yes	Flag Smut.
Manuel, J. ...	8	Gimlet, York gum, and jam	June	Good	Disc	3½	Springtyne cultivated July and Aug. Planted with disc drill	Ford	Mid-April ...	60	90	Copper carbonate	Re-cleaned	Slight trace Flag Smut and Takeall.
Owen, G. H.	New land	Smokebush and tussock	June	Good	Disc	5	Tandem disced in Mar. and harrowed immediately after seeding. Planted with disc drill	Merredin	End 1st week May	40	116	Copper carbonate	Yes	Little Septoria.

BRUCE ROCK FALLOW AND CROP COMPETITION.

Judge—G. L. THROSSELL, Agricultural Adviser.

In addition to the competition included in the Zone Competitions, the Bruce Rock Agricultural Society conducted a local crop competition. It was stipulated that crops entered in this must be grown on fallow which had been judged earlier in the year (see Journal, June, 1931, p. 195), and the places allocated on the combined number of points from both sections of the competition.

Six crops were inspected, awards being made as follows:—

BRUCE ROCK AGRICULTURAL SOCIETY.

Judge—G. L. Throssell, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 pts.	Freedom from Weeds. 10 pts.	Freedom from Disease. 10 pts.	Freedom from Admixture. 15 pts.	Evenness of Growth. 15 pts.	Crop. 100 pts.	Fallow. 100 pts.	Total. 200 pts.
Allen Bros. ...	Central Kuminin	Gluclub	31	9	9	12	14	75	89	164
Schilling, C. E. and N. S.	Bungulluping	Gluclub	29	9	9	12	13	72	91	163
Smith, C. & Sons	Yarding ...	Gluclub	29	8	8	13	13	71	92	163
Brown, S. A.	Bungulluping	Gluclub	28	8	8	12	13	69	93	162
Farrall, F. C. & Sons	Yarding ...	Gluclub	29	8	8	12	13	70	87	157
Strange, P. A.	Yarding ...	Caliph	22	9	8	13	13	65	85	150

The following table shows the rainfalls, as recorded at the centres concerned in the Bruce Rock competitions.

——	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sep.	Oct.	Total.	Nov.	Dec.	Total for year.
Yarding (Rosedale)	...	...	39	53	200	129	234	302	117	52	1,034	13	51	1,190
Emu Hill ...	...	...	11	114	259	148	247	320	132	36	1,142	...	...	...
Bruce Rock ...	...	...	9	160	221	134	216	325	142	44	1,082	16	54	1,321

The cultural details of the competing crops are set out below:—

CULTURAL DETAILS.

Competitor.	When Cleared.	Rotation.	Timber.	When ploughed	Implement	Depth.	Condition of land.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Diseases.
						in.					lb.	lb.	
Allen Bros. ...	1927	2 years. Fallow, Wheat	Gimlet ..	End June	Disc cultivator	3	Good	Springtyne cultivated Aug.	Gluclub	3rd week April	45	100	Trace Takeall.
Schilling, C. E., & N. S.	1922	2 years. Fallow, Wheat	Salmon and gimlet	June	Mouldboard	3	Good	Harrowed end June, skim ploughed early Aug. Springtyne cultivated early Sept. and prior seeding	Gluclub	End April ...	60	75	Flag Smut.
Smith, C. & Sons	1916 and 1921	3 years. Fallow, Wheat, Oats	Salmon and gimlet	June	Disc	3	Good	Disc cultivated July-Aug. Springtyne cultivated Sept.	Gluclub	End April ...	45	70	Takeall.
Brown, S. A. ...	1914	2 years. Fallow, Wheat	Salmon and gimlet	June-July	Mouldboard	3	Good	Rigid-tyne scarified Aug., Sept., Sept.-Oct., and prior to seeding	Gluclub	3rd week May	50	87	Takeall.
Farrall, F. C. & Sons	1912 and 1921	3 years. Fallow, Wheat, Oats	Salmon and gimlet	June	Mouldboard	4	Good	Disc cultivated Aug., springtyne cultivated end April and prior to seeding	Gluclub	Mid-May ...	51	103	Takeall.
Strange, P. A. ...	1924	3 years. Fallow, Wheat, Wheat	Salmon, gimlet, and mallee	June-July	Disc cultivator	3-4	Patchy	Disc cultivated Sept.-Oct. Springtyne cultivated April and prior to seeding	Caliph	End May ...	50	96	Takeall and Flag Smut.

All competitors graded seed wheat and treated it with copper carbonate.

KUKERIN AGRICULTURAL SOCIETY.

Judge—G. L. THROSSELL, Agricultural Adviser.

The seven competitors in the Kukerin Agricultural Society's Competition were not eligible to compete for the championship award for Zone 7 owing to the lateness of their entry.

The awards were made as follow:—

KUKERIN AGRICULTURAL SOCIETY.

Judge—G. L. Throssell, Agricultural Adviser.

Competitor.	District.	Variety.	Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total
			50 pts.	10 pts.	10 pts.	15 pts.	15 pts.	100 pts.
English, J. C. ...	Merilup ...	Free Gallipoli	29	9	8	13	12	71
Williams, T. C....	S. Kukerin ...	Free Gallipoli	27	8	8	13	14	70
Nenke, B. ...	Kukerin ...	Ford	26	9	8	13	13	69
Bahr, O. ...	S. Kukerin ...	Bena ...	24	9	7	12	14	66
Ditchburn, R. ...	N. Kukerin ...	Free Gallipoli	19	8	8	12	13	60
Adams & English	Merilup ...	Nabawa ...	19	8	7	12	12	58
Sugg Bros. ...	Kukerin ...	Bald Early ...	18	7	7	12	12	56

The rainfalls, as recorded at Kukerin during the year, are as follow:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sep.	Oct.	Total.			
Kukerin	...	20	46	101	241	197	202	416	368	54	1,478	38	73	1,756

Hereunder are tabulated the cultural details of the competing crops:—

CULTURAL DETAILS.

Competitor.	Timber.	No. of Crops.	Rotation.	When Plough'd	Implement	Condition of Land.	Dept h.	Subsequent Cultivations.	Variety.	When Planted.	Rate of Seed.	Rate of Super.	Disease.
							in.				lbs.	lbs.	
English, J. C. ...	Jam and salmon	Since 1916	2 years. Fallow, Wheat	March	Rigid-tyne scarifier	Good	2	Rigidtyne scarified June, skim ploughed Aug., scarified prior to seeding with combined cultivator drill	Free Gallipoli	Mid-May ...	50	80	Takeall, Mildew, Loose Smut.
Williams, T. C.	Salmon, jam and morrel	Since 1912	3 years. Fallow, Wheat, Oats	June	Mouldboard	Good	3–4	Disc cultivated mid-Aug. Springtyne cultivated Sept., and prior to seeding with combined cultivator drill	Free Gallipoli	Mid-May ...	50	80	Takeall.
Nenke, B. ...	Salmon and mallee	Since 1915	4 years. Fallow, Wheat, Stubble, Pasture	July	Mouldboard	Good	3	Springtyne cultivated mid-Sept., and prior to seeding with a disc	Ford	3rd week May	50	60	Takeall.
Bahr, O. ...	Salmon and manna	Since 1913	2 years. Fallow, Wheat	July	Mouldboard	Wet	3	Cultivated with combined cultivator drill Oct. Planted with a combined cultivator drill	Bena	Mid-May ...	40	70	Takeall, Rust, Flag Smut.
Ditchburn, R. ...	Salmon, mallee, tea tree	15 years	3 years. Fallow, Wheat, Stubble	July	Mouldboard	Good	4	Springtyne cultivated Aug., twice in Sept., and Oct., and twice prior to seeding with combined cultivator drill	Free Gallipoli	1st week May	70	75	Takeall.
Adams & English	Morrel and mallee	3	4 years. Fallow, Wheat, Oats Pasture	June-July	Mouldboard	Good	3	Springtyne cultivated Sept., and prior to seeding with combined cultivator drill	Nabawa	Mid-May ...	55	90	Takeall.
Sugg Bros. ...	Salmon- ...	Since 1912	4 years. Fallow, Wheat, Wheat, Oats	Aug.	Cultivator disc	Boggy	3	Springtyne cultivated early April. Planted with combined cultivator drill	Bald Early	Mid-April ...	40	80	Takeall.

All seed wheat graded and treated with copper carbonate.

KARLONING PROGRESS ASSOCIATION.

Judge—N. DAVENPORT, Agricultural Adviser.

The 50-acre wheat crop competition, conducted by the Karloning Progress Association, was judged according to the conditions governing the Royal Agricultural Society's competitions, excepting that crops grown on unfallowed land were permitted to compete.

The awards for the eleven crops inspected are as follow:—

KARLONING PRIMARY PRODUCERS' ASSOCIATION.

Judge—N. Davenport, Agricultural Adviser.

Competitor.	Yield. 50 pts.	Freedom from Weeds. 10 pts.	Freedom from Disease. 10 pts.	Freedom from Admixture. 15 pts.	Evenness of Growth. 15 pts.	Total. 100 pts.
Johnston, H.	19	9	9	14	12	63
O'Neil, H.	15	9	9	13	13	59
Driver, H	15	9	8	14	12	58
Tallis, W.	15	9	7	14	13	58
Hewitt, E. E.	15	8	9	13	12	57
Seeby, H.	14	8	8	14	12	56
Broomhall, V.	14	9	7	13	12	55
Hewitt, B. G.	14	7	9	13	12	55
McInnes, P.	13	8	9	13	12	55
Bell, G.	14	8	7	13	12	54
Borlace, J.	10	9	9	14	11	53

The rainfalls, as recorded at Karloning during the year, are as hereunder:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sep.	Oct.	Total.			
Karloning ...	...	...	12	57	350	113	211	115	123	42	954	72	4	1,099

The cultural details of the competing crops are summarised below:—

CULTURAL DETAILS

Competitor.	No. years Cropped.	Timber.	When Ploughed.	Condition of Land.	Implement	Depth.	Subsequent Cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Disease.
Johnston, H. ...	New land	Mallee scrub	Aug.	Good	Disc	in. 3-4	Planted with combined cultivator drill	Nabawa	4th week April	lbs. 30	lbs. 70	
Driver, H. ...	2	Salmon and gimlet	...	...	...	...	Planted with combined cultivator drill after good stubble burn	Nabawa	2nd week May	30	60	Trace Flying Smut.
Tallis, W. ...	2	Salmon and gimlet	...	...	...	...	Planted with combined cultivator drill on stubble land	Gluyas Early	3rd week April	30	45	Trace Flag Smut.
Hewitt, E. E. ...	3	Salmon, gimlet, and mallee	July	Good	Disc	3½	Cross-ploughed with sundercut mid-Aug. Planted with disc drill	Gluyas Early	1st week May	30	40	
Seeby, H. ...	3	Salmon gimlet, mallee and broom bush	July	Good	Disc	3	Planted with combined cultivator drill	Gluyas Early	2nd week May	25	45	
Broomhall, V. ...	2	Gimlet and mallee	...	...	...	...	Planted with combined cultivator drill	Gluyas Early	1st week May	35	60	Flag Smut.
Hewitt, B. G. ...	6	Gimlet, salmon, brown mallee	July	Wet	Disc	3½	Cultivated with springtyne cultivator in Oct., harrowed Nov. Planted with combined cultivator drill	Gluyas Early	2nd week May	30	36	
McInnes, P. ...	2	Mallee ...	...	...	...	...	Planted with combined cultivator drill after stubble burn	Gluyas Early	3rd week May	36	45	
Bell, G. ...	3	Salmon and gimlet	...	...	...	...	Planted with combined cultivator drill after stubble burn	Gluyas Early	2nd week May	39	60	Flag Smut.

Particulars from H. O'Neil and J. Borlace not to hand. All competitors graded and treated seed wheat with copper carbonate.

PHILLIPS RIVER AGRICULTURAL SOCIETY.

Judge—G. L. THROSSELL, Agricultural Adviser.

Nine competitors submitted crops for inspection in the crop competition conducted by the Phillips River Agricultural Society, Ravensthorpe, the awards being made as follow:—

PHILLIPS RIVER AGRICULTURAL SOCIETY—RAVENSTHORPE.

Judge—G. L. Throssell, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 pts.	Freedom from Weeds. 10 pts.	Freedom from Disease. 10 pts.	Freedom from Admixture. 15 pts.	Evenness of Growth. 15 pts.	Total. 100 pts
McCulloch, J. ...	Ravensthorpe	Nabawa ...	26	9	9	13	13	72
Love, N. S. ...	Ravensthorpe	Ford ...	24	9	8	13	14	68
Smith, W. H. ...	Kumba ...	Nabawa ...	24	9	8	13	13	67
Campbell, J. ...	Mt. Short ...	Gluyas Early	22	9	8	14	14	67
Metz, E. ...	Ravensthorpe	Merredin ...	22	9	9	13	14	67
Chambers Bros.	Ravensthorpe	Gluyas Early	21	8	8	13	14	65
Barrett Bros. ...	Mt. Short ...	Nabawa ...	19	9	9	13	14	63
Bebbington Bros.	Mt. Short ...	Nabawa ...	17	9	9	13	14	62
Hambly, L. ...	Ravensthorpe	Nabawa ...	18	9	8	13	13	61

The following rainfalls were recorded during the year at the centres nearest to the competing crops:—

	Jan.	Feb.	Apl.	Apl.	Growing Period. May	June.	July.	Aug.	Sep.	Oct.	Total.	Nov.	Dec.	Total for year.
Ravensthorpe ...	8	26	35	136	198	157	163	441	183	45	1,187	105	29	1,521
Mt. Short ...	4	13	25	127	221	134	124	372	175	38	1,064	77	30	1,340
Hopetoun ...	22	17	56	165	242	258	202	385	303	162	1,552	102	37	1,951

ERRATUM.

EXPERIMENT ON GREEN MANURING.

Unfortunately some of the figures were misplaced in the statement in the experiment in the last issue of the "Journal of Agriculture." The corrected figures are as follow:—

Plots.	Weight of plot in tons.	Weight per acre. tons.	cwts.	Mean of control. tons.	cwts.	Gain or Loss.
Field Peas control ...	·825	12	9·98	...		8·4 cwt.
Peas and Tick Beans ...	·8091	12	5·18	...		13·2 ..
Tick Beans	·7880	11	19·18	12	18·38	19·2 ..
Vetches	·7616	11	10·78	...		1 ton 7·6 ..
Field Peas control ...	·8804	13	6·78	...		8·4 ..

THE COST OF FEEDING PURE-BRED COWS UNDER THE AUSTRALIAN OFFICIAL HERD RECORDING SCHEME, WESTERN AUSTRALIA, 1930-31.

G. K. BARON-HAY and L. C. SNOOK.

Over a period of years an endeavour has been made by the West Australian Department of Agriculture to estimate the cost of the rations fed to the cows in the various pure-bred herds under official test. The Herd Testing Officer, on his monthly visit to each herd, ascertains as accurately as possible the food fed to cows under test, the character of pasture being grazed and fodder crops fed. From these reports the value of the food fed to the stock for the lactation period may be gauged.

The various foodstuffs were valued as under:—

	£ s. d.	
Chaff—Oaten or Wheaten	3 17 6	per ton.
Clover Hay	2 15 0	,,
Silage	0 7 0	,,
Wheat	0 2 9	per bus.
Oats (Crushed)	0 1 9	,,
Bran	6 0 0	per ton.
Pollard	6 6 0	,,
Linseed Meal	13 10 0	,,
Lucerne Hay	6 0 0	,,
Green Lucerne	1 10 0	,,
,, Maize ... } Chaffed		
,, Sudan Grass } Grazed ...	0 6 0	,,
,, Barley }	0 2 6	per head per week.
Pasture	0 1 6	per head per week.
Oilcake	0 12 0	per cwt.

The results obtained for the twelve months beginning July, 1930, illustrate in no uncertain fashion the remarkable fall in the cost of feeding cows under test, due in most instances to better methods of managment enabling the bulk of the fodder to be produced on the farm.

TABLE 1.

Year.	Average Cost of Feed per Cow for nine months.	Cost of Feed to produce 1 gallon Milk.	Cost of Feed to produce 1 lb. Fat.
	£ s. d.	d.	d.
Average—1924–30	14 3 8	5·54	11·42
1929–30	14 10 3	5·10	12·74
1930–31	9 14 7	3·63	7·74

This fall in the cost of feeding a cow under test has more than compensated for the drop in prices received for dairy produce, and demonstrates one rapid method by which dairy farmers can meet and, in many instances, are meeting the present fall in value of butter fat.

Table 2.

Comparison of Fall in Value of Butter Fat with Cost of Feeding.

Year.	Average Monthly Price of Butter Fat per lb.	Per cent. fall in Price.	Average Cost of Feed to produce 1 lb. of Butter Fat.	Per cent. decrease in Cost of Feeding.
	s. d.	%	d.	%
1924–30	1 7·1	...	11·42	...
1931	1 3	20·9	7·74	32·2

This fortunate circumstance is in a large measure due to the increased use of home-grown materials. It is no coincidence that all the herds which stand out as cheap producers of milk and butter-fat use meadow hay (or its equivalent) and silage, with crushed oats (generally home grown) as the grain supplement.

Table 3.

The Value of Home-Grown Fodders.

	"A." With Silage. 6 Herds.	"B." No Silage. 10 Herds.	Per cent. in favour of Herds having Silage.
	d.	d.	%
Per 1lb. Butter Fat	6·04	9·18	52
Per 1 gallon Milk	3·00	4·36	45·3

The farmer who maintains good pastures by adequate fertilisation and wise management, who conserves ample meadow hay and has silage as the succulent base for his summer ration, and who grows his own concentrates in the form of oats and peas, has no need to purchase foodstuffs for his stock. This is well illustrated by the three herds which had the lowest feed costs per cow in the year under review.

Herd "M," owned by Messrs. Giblett and Johnston, produced both milk and fat at a very low cost, but as they had a very small herd (average 4⅓ cows for year) which was not fed to give high production, the significance of their results must be somewhat discounted. Practically no foodstuffs were purchased for this herd, entire dependence being placed on the natural pastures, hay and silage, the latter being of only medium quality. The yields fell off greatly during the summer, and it is certain that more expensive feeding during this period, in order to enable the cows to produce to their capacity, would have been profitable. The returns show what can be done in the absence of any concentrates whatsoever. The yields of these cows also would have been higher had the silage available been of good quality.

Herd "F," owned by Mr. P. Rose, is the largest herd under test, and the low cost of feeding combined with the high average return of butter-fat (322.7 lbs.) testifies to sound and economical feeding practice. Very little foodstuff is purchased. Mr. Rose has extensive pastures of clovers and mixed grasses, but has no summer land. Hence reliance is placed on ample meadow hay and the

use of stack silage. Crushed oats are used as the grain supplement, while chaffed maize is used in the early summer. Most of the cows are timed to calve in order that they may end their lactation period about January, so as to be resting during that portion of the year most inimical to cheap milk production. Oats and peas are grown extensively as forage and grain crops. (See Tables 6 and 7.)

Herd "J," at the Denmark Stud Farm, is also a large herd with a good average production (290 lbs.) of butter-fat. The need for purchased foods is here again avoided by good pasture management, and the use of meadow hay, silage, and crushed oats. As one would expect, considerable amounts of chaffed greenstuff were fed to the stock during the year.

These three herds indicate the aim in dairy practice—independence of purchased foods.

Another circumstance well worthy of note is the great difference in profit resulting to the farmer, according as to whether he sells whole-milk or butter-fat. (See Table 9.) The vendor of whole-milk receives approximately double the profit than does the less fortunate farmer selling the equivalent as butter-fat. For example, if the produce of the 15 cows in the Denmark Guernsey herd (essentially butter-fat producers) was sold as whole-milk instead of as butter-fat, the resultant extra profit would amount to over £130 in a year. With Mr. W. G. Burges' herd of 16 Australian Illawarra Shorthorns, the difference is approximately £300 in favour of selling whole-milk. These figures are based on the values—whole-milk at 1s. 1d. per gallon and butter-fat at 1s. 4d. per lb., with allowance for skim milk being worth 1d. per gallon. The figures indicate why suppliers of whole-milk situated near the metropolitan area can maintain herds despite the high cost of feeding with purchased fodders.

As in previous years, the various breeds have been compared as regards cost of feeding and average yields. (See Table 4.) Very little significance can be attached to these figures, however, as an argument supporting any one breed. One expects the Shorthorn breed to excel as whole-milk producers and to consume more fodder per head than either of the other two breeds recorded, but this is in part compensated for by the larger calf. The relative positions of the Jersey and Guernsey change from year to year, first one breed and then the other appearing to be the cheaper producers of butter-fat.

TABLE 4.

Breed.	Average Yield of Butter Fat.	Average Yield of Milk.	Average Cost of Feed.
	lb.	gals.	£ s. d.
Jersey (7 herds)	321·8	617·1	9 8 2
Guernsey (4 herds)	312·4	608·1	8 19 11
Australian Illawarra Shorthorn (5 herds)	275·8	689·3	10 8 4

Following is a series of tables showing:—

5. Herds in Order of Merit as Producers of Butter-fat.
6. Herds in Order of Merit as Producers of Milk.
7. Herds in Order of Merit showing Cost of Producing 1lb. of Butter-fat.

8. Herds in Order of Merit showing Cost of Producing 1 gallon of Milk.
9. Average for Eight-Year Period.
10. Average for Year 1930-31.

TABLE 5.

HERDS IN ORDER OF MERIT AS PRODUCERS OF BUTTER FAT.

Herd.	Breed.	Average Production of Butter Fat per cow for 9 months.	Average Production of Skim Milk per cow for 9 months.	Value of Butter Fat at 1s. 4d. lb.	Value of Skim Milk at 1d. gal.	Gross return for Fat and Skim Milk.	Cost of Feed per cow for 9 months.	Profit per cow by sale of Butter Fat.	Cost of Feed to produce 100lbs. Butter Fat.	Cost of Feed to produce 1lb. Butter Fat.
		lbs.	gals.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	pence.
A	Jersey	408·76	680·7	27 5 0	2 16 10	31 1 10	11 10 0	19 11 10	2 16 4	6·77
B	Guernsey	383·55	633·88	25 11 5	2 12 10	28 4 3	12 15 0	15 9 3	3 6 6	7·98
C	Australian Illawarra Shorthorn	365·00	774·7	24 6 8	3 4 7	27 11 3	9 3 1	18 8 2	2 10 0	6·00
D	Jersey	353·55	527·6	23 11 5	2 3 11	25 15 4	9 9 0	16 6 4	2 13 3	6·38
E	Australian Illawarra Shorthorn	350·00	794·5	23 6 8	3 6 2	26 12 10	11 16 1	14 16 9	3 7 3	8·06
F	Jersey	322·70	600·93	21 10 3	2 10 10	24 1 1	6 7 10	17 13 3	1 19 8	4·75
G	Jersey	317·00	539·9	21 2 8	2 4 2	23 6 10	10 19 0	12 7 10	3 9 1	8·28
H	Guernsey	310·29	533·8	20 13 8	2 4 6	22 18 2	10 7 5	12 10 9	3 4 3	7·70
I	Jersey	300·49	487·6	20 0 8	2 0 8	22 1 4	13 3 0	8 18 4	4 7 3	10·46
J	Guernsey	290·00	500·5	19 6 8	2 1 8	21 8 4	7 7 4	14 1 0	2 10 10	6·10
K	Jersey	270·90	493·1	18 1 3	2 1 1	20 2 4	10 19 7	9 2 9	4 1 2	9·74
L	Jersey	264·6	431·4	17 12 8	1 15 11	19 8 7	11 8 2	8 0 5	4 6 2	10·32
M	Guernsey	260·9	529·7	17 7 10	2 4 2	19 12 0	3 19 10	15 12 2	1 10 9	3·69
N	Australian Illawarra Shorthorn	260·07	632·3	17 6 9	2 12 6	19 19 3	11 8 0	8 11 3	4 7 9	10·53
O	Australian Illawarra Shorthorn	237·4	553·8	15 16 5	2 6 2	18 2 7	10 1 2	8 1 5	4 4 9	10·17
P	Australian Illawarra Shorthorn	229·98	503·6	15 6 8	2 1 11	17 8 7	10 11 7	6 17 0	4 12 0	11·04
	Average	301·6	579·0	20 2 2	2 8 3	22 10 5	9 14 7	12 15 10	3 4 6	7·74

TABLE 6.

HERDS IN ORDER OF MERIT AS PRODUCERS OF MILK.

Herd.	Average Yield of Milk per Cow for 9 months.	Value of Milk at 1s. 1d. gal.	Cost of Feed per Cow for 9 months.	Profit on Sale as Whole Milk.	Cost of Feed to produce 1 gal. of Milk.	Breed.
	gals.	£ s. d.	£ s. d.	£ s. d.	pence.	
E	882·8	47 16 4	11 16 1	36 0 3	3·20	Australian Illawarra Shorthorn.
C	860·8	46 12 6	9 3 1	37 9 5	2·55	Australian Illawarra Shorthorn.
A	767·5	41 11 9	11 10 0	30 1 9	3·59	Jersey.
B	737·6	39 19 2	12 15 0	27 4 2	4·14	Guernsey.
N	702·6	38 1 2	11 8 0	26 13 2	3·89	Australian Illawarra Shorthorn.
F	667·7	36 3 4	6 7 10	29 15 6	2·30	Jersey.
O	615·4	33 6 8	10 1 2	23 5 6	3·92	Australian Illawarra Shorthorn.
G	599·9	32 10 0	10 19 0	21 11 0	4·38	Jersey.
H	593·1	32 2 6	10 7 5	21 15 1	4·20	Guernsey.
M	588·4	31 17 5	3 19 10	27 17 5	1·63	Guernsey.
D	586·2	31 15 0	9 9 0	22 6 0	3·87	Jersey.
P	559·6	30 6 3	10 11 7	19 4 8	4·54	Australian Illawarra Shorthorn.
J	556·1	30 2 5	7 7 4	22 15 1	3·18	Guernsey.
K	547·9	29 13 6	10 19 7	18 13 11	4·93	Jersey.
I	541·8	29 6 11	13 3 0	16 3 11	5·83	Jersey.
L	479·3	25 9 3	11 8 2	14 1 1	5·71	Jersey.
Average	643·3	34 16 11	9 14 7	25 2 4	3·63	

TABLE 7.

HERDS IN ORDER OF MERIT SHOWING COST OF FEED PER POUND OF BUTTER FAT PRODUCED.

Herd.	Cost of Feed per 1lb. of Fat.	Under Average.	Over Average.	Breed.
	pence.	pence.	pence.	
M	3·69	4·05	...	Guernsey.
F	4·75	2·99	...	Jersey.
C	6·00	1·44	...	Australian Illawarra Shorthorn.
J	6·10	1·34	...	Guernsey.
D	6·38	1·06	...	Jersey.
A	6·77	0·67	...	Jersey.
H	7·70	0·04	...	Guernsey.
B	7·98	...	0·24	Guernsey.
E	8·06	...	0·32	Australian Illawarra Shorthorn.
G	8·28	...	0·54	Jersey.
K	9·74	...	2·00	Jersey.
O	10·17	...	2·43	Australian Illawarra Shorthorn.
L	10·32	...	2·58	Jersey.
I	10·46	...	2·72	Jersey.
N	10·53	...	2·79	Australian Illawarra Shorthorn.
P	11·04	...	3·30	Australian Illawarra Shorthorn.
Average	7·74	...	...	...

TABLE 8.

HERDS IN ORDER OF MERIT SHOWING COST OF FEED TO PRODUCE ONE GALLON OF MILK

Herd.	Breed.	Cost of Food to produce 1 gal. Milk.	Below Average Cost.	Over Average Cost.
		pence.	pence.	pence.
M	Guernsey ...	1·63	2·00	...
F	Jersey	2·30	1·33	...
C	Australian Illawarra Shorthorn	2·55	1·08	...
J	Guernsey ...	3·18	0·45	...
E	Australian Illawarra Shorthorn	3·20	0·43	...
A	Jersey	3·59	0·04	...
D	Jersey	3·87	...	0·24
N	Australian Illawarra Shorthorn	3·89	...	0·26
O	Australian Illawarra Shorthorn	3·92	...	0·29
B	Guernsey ...	4·14	...	0·51
H	Guernsey ...	4·20	...	0·57
G	Jersey	4·38	...	0·75
P	Australian Illawarra Shorthorn	4·53	...	0·90
K	Jersey	4·93	...	1·30
L	Jersey	5·71	...	2·08
I	Jersey	5·83	...	2·20
Average	...	3·63	...	...

TABLE 9. HERD AVERAGES FOR EIGHT YEARS, 1924–1931.

Year.	Milk.	Average Fat per Cow for period of 9 months.	Average Skim Milk per Cow for period.	Value of Fat for period.	Value of Skim Milk for period at 2d. per gallon.	Average Value of Fat and Skim Milk for period.	Cost of Feed per Cow for period.	Net Profit per Cow for period through Sale of Fat.	Value of whole Milk at 1/3 per gallon allowing for rearing Calf.	Net Profit per Cow through Sale of Fresh Milk at 1/3 per gallon.	Average Cost to produce 1lb. Fat.	Average Cost to produce 1 gall. Milk.
	gallons.	lbs.	lbs.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	pence.	pence.
1924 ...	600	319·50	362	At 1/7½ per lb. 25 19 2	3 0 4	28 19 6	10 4 10	18 4 8	32 1 3	21 16 5	7·7	4·09
1925 ...	652	308·59	407	At 1/5½ per lb. 22 10 0	3 7 10	25 17 10	14 13 2	11 4 8	30 10 5	15 9 5	10·77	6·15
1926 ...	624	312·01	393	At 1/7 per lb. 24 14 0	3 5 6	27 19 6	14 14 7	13 4 11	32 5 5	17 10 10	11·15	5·66
1927 ...	602	290·72	362	At 1/7 per lb. 23 0 4	3 0 4	26 0 8	14 10 5	12 6 8	31 10 6	17 0 1	12·00	5 79
1928 ...	592	280·56	353	At 1/7½ per lb. 22 15 9	2 18 10	25 14 7	15 11 4	10 3 3	30 19 0	15 7 8	13·34	6·34
1929 ...	629	295·10	386	At 1/8 per lb. 24 11 10	3 4 4	27 16 2	15 1 0	12 15 2	33 6 9	18 5 9	12·24	5·74
1930 ...	636	294·98	369	At 1/7½ per lb. 23 19 6	3 5 4	27 4 10	14 10 3	12 14 7	30 3 3	15 13 0	12·74	5·10
1931 ...	643	306·1	399	At 1/4 per lb. 20 2 2	At 1d. gal. 1 13 3	21 15 5	9 14 7	12 0 10	At 1/1 gal. 25 10 1	At 1/1 gal. 15 15 6	7·74	3·63
Average of 8 years	622	300·94	379	At 1/6¾ per lb. 23 11 6	2 19 6	26 11 0	13 12 6	12 18 6	30 15 10	17 2 4	10·96	5·31

During the year 1930-31 the average cow under test produced in nine months:—

TABLE 10.

1. 643 gallons of Milk.
2. 301·6 lbs. of Butter Fat.

	£	s.	d.
Value of Butter Fat at 1s. 4d. per lb.	20	2	2
Value of Skim Milk at 1d. per gallon	2	8	3
Total Return by Sale of Butter Fat ...	22	10	5
Cost of Feed for Period	9	14	7
	£12	15	10
Value of Whole Milk at 1s. 1d. per gallon ...	34	16	11
Cost of Feed	9	14	7
Profit by Sale of Whole Milk	£25	2	4
Cost of Feed to produce 1 gallon of Milk ...	3·63d.		
Cost of Feed to produce 1 lb. of Butter Fat ...	7·74d.		

OAT VARIETY TRIALS, DENMARK, 1931.

G. GAUNTLETT, Agricultural Adviser, Dairy Branch.

The Oat Variety Trials conducted in the Denmark district were continued during 1931.

This experiment was conducted on the property of C. Crellin, with the following results:—

Soil: Red karri loam. During 1930 potatoes were grown.

Cultivation: Ploughed first week in June. The seed and fertiliser were broadcast and harrowed in on 12th June.

Rate of Seeding: 2 bushels per acre.

Fertiliser: Superphosphate, 120 lb. per acre.

Rainfall during growing period: 32 inches.

The yields obtained were as follow:—

GREEN MATERIAL.

Variety.	Yield—(Average of 3 plots.)				Percentage Yields.
	tons.	cwts.	qrs.	lbs.	
Algerian	5	0	3	18	100
Guyra	5	0	3	9	99·9
Mulga	4	6	1	21	87·4
Burt's Early	2	15	3	7	55·5
Lachlan...	2	14	0	1	53·5

Very little difference could be seen between the plots until several months after germination. At the time of cutting, the "Algerian" and "Guyra" were not so mature as the other varieties and yet they returned far greater bulk.

As has invariably proved the case in these experiments, "Algerian" has proved itself to be one of the best varieties. The failure of "Lachlan" is somewhat surprising. In last year's trials at the Denmark State Farm, "Lachlan" returned the heaviest yield of hay per acre. Too great an importance should not be attached to results from any one year. Experiments must be conducted over a period of three to five years before definite conclusions may be accurately drawn. In this connection, it is of interest to study the tabulated results of all the variety trials conducted in the Denmark area by the Department of Agriculture.

Variety.												Place conducted.	Year.
Algerian.		Lachlan.		Guyra.		Mulga.		Burt's Early.					
tons.	cwt.	tons	cwt.	tons	cwt.	tons	cwt.	tons	cwt.				
...		4	6	3	12	...		2	18			Group 41	1929
...		5	8	3	12	...		4	8			Group 41	1929
...		3	10	3	1	...		3	1			Group 105 ...	1929
2	15	2	7	2	12	2	8	2	6			Group 41	1930
9	8	10	14	9	2	...		...				Denmark S.F. ...	1930
5	1	2	14	5	1	4	6	2	16			Scotsdale	1931
Av. 5	15	4	17	4	10	3	7	3	2				

The following is a summary of Oat Variety Trials carried out in the Denmark district:—

OAT VARIETIES—DENMARK DISTRICT.

Purpose for which grown.	Time of Sowing.	Varieties recommended.
Early Autumn Fodder	February–March	Burt's Early Mulga
Spring Green Fodder	July–September	Lachlan Guyra
Main Crop for Hay	May–June	Algerian Guyra Lachlan

Cultivation, etc.

For early feed, the land should be well worked to a fine tilth and a firm seed bed. For other purposes it is not necessary to work the land to a fine tilth.

Seed should be sown at not less than 2 bushels per acre, and superphosphate applied at the rate of 1½ to 2 cwts. per acre.

Experiments also have shown that "Burt's Early" is preferable to barley for early autumn feed.

FRUIT EXPORT FOR 1932.

GEO. W. WICKENS, Superintendent of Horticulture.

The export season for fresh and dried fruits will be in full swing when the Journal containing these notes is published, but particulars of boats and quantities as shown hereunder will be of interest to readers. Until late in February grave doubts were felt regarding shipping as there seemed a big possibility that the space offering would be insufficient to lift the quantity of fresh fruit available for export, but owing to the united efforts of various bodies—particularly the Fruit Shippers' Committee—difficulties were overcome and a very good programme was arranged. Space has been ordered for a total of 661,240 cases, and to lift this quantity nine boats are calling at Albany and 25 at Fremantle, and the shipping season will extend from 13th February to 23rd May.

Details referred to are as follow:—

Date of Sailing. 1932.	Vessel.	Quantity.	Port.
Feb. 13th ...	"Jervis Bay"	6,000 cases ...	Fremantle.
„ 28th ...	"Surrey"	14,000 „ ...	„
Mch. 7th ...	"Orontes"	2,300 „ ...	„
„ 9th ...	"Bitterfeld"	20,000 „ ...	Albany.
„ 10th ...	"Barrabool"	30,750 „ ...	Fremantle.
„ 11th ...	"Port Nicholson" ...	135,200 „ ...	Albany 70,900 Fremantle 64,300
„ 14th ...	"Mooltan"	5,100 „ ...	Fremantle.
„ 14/19th ...	"Turakina"	41,900 „ ...	„
„ 17th ...	"Port Sydney" ...	46,400 „ ...	Fremantle 11,200 Albany 35,200.
„ 18th ...	"Larg's Bay"	23,000 „ ...	Fremantle.
„ 21st ...	"Strathnaver" ...	720 „ ...	„
„ 24th ...	"Nestor"	5,250 „ ...	„
„ 28th ...	"Orsova"	1,000 „ ...	„
„ 30th ...	"Port Hardy" ...	49,000 „ ...	Albany.
April 1st ...	"Ceramic"	11,000 „ ...	Fremantle.
„ 4th ...	"Maloja"	5,000 „ ...	„
„ 5th or 6th	"Limerick"	7,000 „ ...	Albany.
„ 8th ...	"Moreton Bay" ...	23,000 „ ...	Fremantle.
„ 11th ...	"Orford"	2,000 „ ...	„
„ 13th ...	"Corrientes"	50,000 „ ...	Albany.
„ 14th ...	"Balranald"	10,000 „ ...	Fremantle.
„ 18th ...	"Strathaird"	720 „ ...	„
„ 20th ...	"Strassfurt"	25,000 „ ...	Albany.
„ 22nd ...	"Esperance Bay" ...	23,000 „ ...	Fremantle.
„ 25th ...	"Orama"	2,300 „ ...	„
„ 27th ...	"Canonesa"	50,000 „ ...	Albany.
May 2nd ...	"Comorin"	2,500 „ ...	Fremantle.
„ 9th ...	"Ormonde"	1,000 „ ...	„
„ 10th ...	"Ulysses"	5,250 „ ...	„
„ 12th ...	"Bendigo"	18,350 „ ...	Albany.
„ 20th ...	"Hobson's Bay" ...	23,000 „ ...	Fremantle.
„ 23rd ...	"Baradine"	21,500 „ ...	„
	Total ...	661,240 „	

At time of writing, 1st March, only two small lines of those mentioned above have gone forward, but I am pleased to note that both apples and pears have, in the main, been of good quality and well packed, and I am taking this as a favourable augury for a successful season.

So many unfavourable comments have been made recently concerning the condition of Australian fruit upon arrival in England that it behoves all growers to select carefully, reject rigorously, grade evenly, both in size and colour, and pack

correctly, so that the good name which Western Australian fruit has won on the overseas markets may be retained.

Amendments to the regulations governing the export of fresh fruit have recently come into force, and as printed copies of these are not yet available I quote hereunder extracts that concern rather materially shippers in this State. The first deals with the collection of three-eighths of a penny on every case offered for shipment, and reads as follows:—

104. (1) There shall be paid to the Collector of Public Moneys of the Department of Markets in the States of Victoria, New South Wales, and Queensland, and the Collector of Customs in the States of South Australia, Western Australia, and Tasmania, an inspection fee of three-eighths of one penny in respect of each case of apples and pears intended for export.

(2) Any such apples or pears shall not be permitted to be removed for home consumption from any appointed place, nor shall an export permit be issued therefor, until the fees in respect of the apples or pears have been paid.

(3) For the purposes of this regulation two half cases or three trays shall be regarded as the equivalent of one case.

Although this is described as an inspection fee it is really being collected by the Commonwealth Government at the request of growers and shippers, and is to be used mainly in advertising Australian fruit in the overseas markets.

The second item quoted refers to the cases which may be used for exporting fruit. The original regulations specified only the cases which could be used for apples, pears, and oranges, but the amended regulations prescribe cases for apples, pears, citrus fruits, grapes and stone fruits. Shippers will note that the three-quarter bushel flat is now a grape case only, and cannot be used for pears or stone fruits as in the past. Also that the dump case can no longer be used when shipping fruit to England, Canada and the Far East—Singapore, Java, etc. The case prescribed for this purpose being the package having dimensions 24in. x 11½in. x 11½in. in use in other parts of the world. Particulars are as under:—

Regulation 47 of the Commerce (General Exports) Regulations is repealed and the following regulation inserted in its stead:—

PACKING OF FRESH FRUITS.

47. Fresh fruit intended for export shall be packed in accordance with the following provisions:—

(a) Subject to paragraph (d) of this regulation, the fruit shall be packed only in cases or trays of the following dimensions specified for the various kinds of fruit:—

Descriptions of Case or Tray.	Inside measurements in inches (clear of divisions).						Kinds of fruits for which case or tray shall be used.
	Length.		Depth.		Width.		
Citrus	24	x	11½	x	11½		Citrus fruit only.
Citrus bushel	20	x	10	x	11½		,, ,,
Australian bushel	18	x	14¼	x	8⅝		Apples, pears, citrus.
Standard bushel	18	x	10½	x	11½		,, ,, ,,
Australian half bushel	18	x	7⅛	x	8⅝		Apples, pears, stone fruit.
Standard half bushel	18	x	5¼	x	11½		Apples, stone fruits.
Flat bushel	26	x	14¼	x	6		Pears.
Pears	18	x	8	x	11½		,,
Flat three-quarter bushel ...	24	x	11¾	x	6		Grapes only.
Flat half bushel	26	x	7⅛	x	6		Stone fruit only.
Tray	18	x	Any depth	x	14¼		Apples, pears, grapes, stone fruits.
Tray	18	x	Any depth	x	11½		Apples, pears, grapes, stone fruits.

Provided that those dimensions may show a variation to the extent of not more than 10 per centum (that is, 5 per centum under or 5 per centum above) on the total cubic capacity of the case or tray.

(b) Only one layer of apples shall be packed in each tray.

(c) The fruit shall be packed in clean new cases or trays constructed of well-seasoned soft-wood or hard-wood that has been smoothly sawn or dressed in an approved manner, and in the opinion of the Collector sufficiently strong to withstand such handling as is ordinarily incidental to transport to destinations beyond the Commonwealth.

(d) Citrus fruits intended for export to any port in Great Britain or Canada or to any Eastern port shall be packed only in the type of case described as "citrus" in paragraph (a) of this regulation.

Dried vine fruit was exported from Western Australia earlier this season than for many years past, the "Jervis Bay" taking 37 tons on the 13th February.

NORTH DRAKESBROOK—EXPERIMENTAL PLOTS.

C. GILES, Dairy Instructor.

At the request of the North Drakesbrook branch of the Primary Producers' Association, and following a series of experiments designed three years ago to demonstrate economical methods of establishing pastures on the wet sandy loams overlying clay at various depths (up to 24 inches) general in that district, the following methods were employed:—

Ploughed *v.* Unploughed land and seeded with the following mixture in May, 1928:—

Subterranean Clover	4 lb. per acre.
White Dutch Clover	1 lb. „
Paspalum Dilatatum	5 lb. „
Cocksfoot	5 lb. „
Lotus major	1 lb. „
Total	17 lb. „

The areas were top-dressed with superphosphate at the rate of 2 cwt. per acre.

Results had shown that Subterranean Clover in the early stages on this land was outstanding. Indications, however, were that Lotus major, White Dutch Clover, and Perennial Rye Grass will all have a place in pasture mixture sown some years later when soil fertility has increased.

By request of that Association further trials were made this year to discover the possibilities with regard to further improvement over the same area by the introduction of blade grasses. Wimmera Rye Grass, Perennial Rye Grass, and Cocksfoot were selected as being likely, and these were seeded on 25th May, 1931, at the following rates:—

Wimmera Rye Grass	10 lb.
Perennial Rye Grass	8 „
Cocksfoot	2 „
Total	20 „

over the whole area, 1½ acres.

Plots ⅛ acre each in triplicate were fertilised as follows:—

No. 1 Super. 150 lb. + Sulphate of Ammonia 28 lb. per acre.

No. 2 Super. 150 lb. + Sulphate of Ammonia 56 lb. per acre.

No. 3 Super. 2 cwt. + Sulphate of Ammonia 56 lb. per acre.

The variation in Superphosphate was made in order to compare its influence with the lighter application.

Preparation of Seed Bed.

Arrangements had been made to seed up on 21st May, but on inspection it was found that owing to an exceedingly heavy growth of clover the previous season, and total lack of grazing, it was impossible to seed up with any hope of success, without first removing this bulk.

This surplus growth was therefore removed by hand labour, and the ground then disc-harrowed ready for planting on 25th May.

Method of Seeding.

Seed and fertilisers were mixed and broadcasted immediately by hand and lightly harrowed in.

Inspections.

Inspections were made and conditions noted as follows:—

July 7th.—Germination good; growth satisfactory.

Aug. 11th.—Germination good; growth satisfactory.

Sept. 8th.—Cocksfoot not to be found; badly water-logged.

Oct. 2nd.—Excellent growth of Rye Grasses requiring to be fed off, but too wet for stock to graze.

Oct. 26th.—Inspection arranged with members of the Association prior to grazing, and cows were turned in on the same day.

Results.

Inspection showed that Clovers and Rye Grasses were good right through, subterranean clover predominating:—

Plots No. 1.—Grasses slightly less.

Plots No. 2.—Clovers slightly less than No. 1.

Plots No. 3.—Apparently more bulk; both grasses and clovers excellent. Cocksfoot could not be located anywhere.

Summary.

1. It is evident that Rye Grasses can be easily and successfully established on this class of country after having been down to subterranean clover for at least two years.

2. That drainage, however, is absolutely essential in order that pastures may be grazed throughout the winter when these grasses are most profitable; and unless controlled by this means, little benefit is derived from their inclusion.

3. That heavier applications of phosphates up to 200 lbs. per acre in conjunction with nitrogenous fertilisers are beneficial on mixed pastures and on this type of soil.

A NEW NOXIOUS WEED.

THE DEVIL'S CLAW

Martynia (*Proboscidea*) *Louisiana*, Mill.

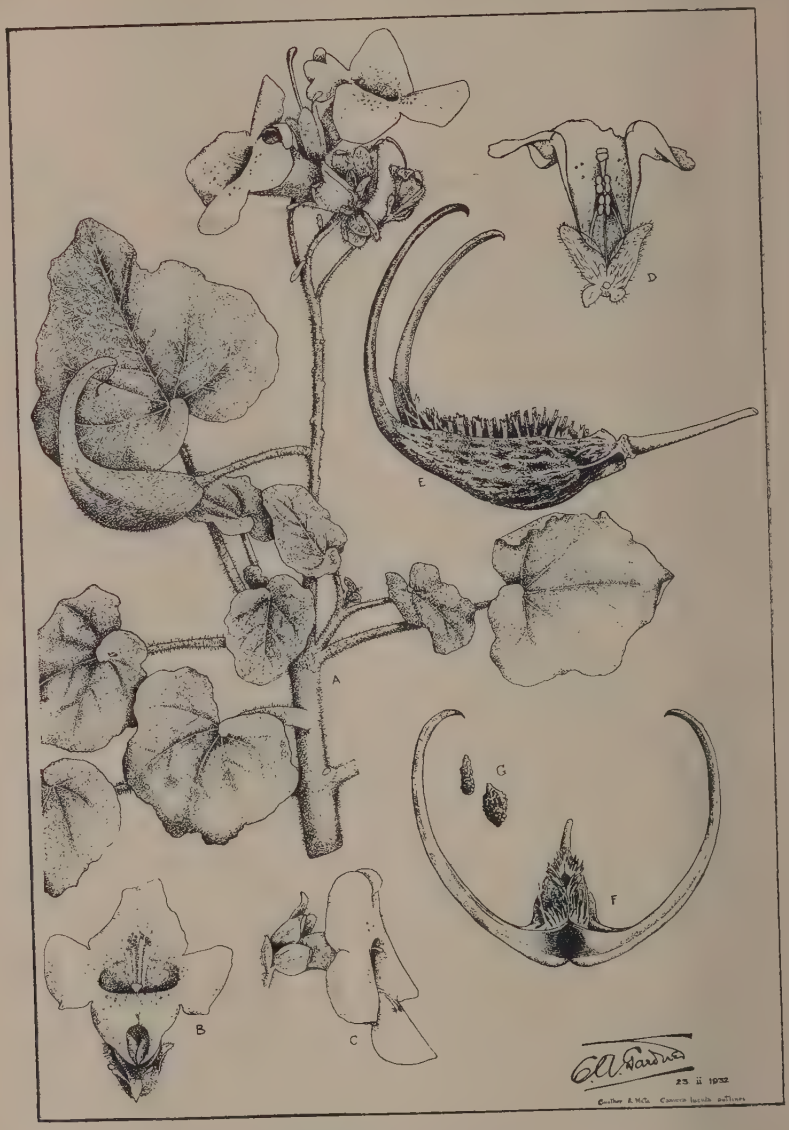
C. A. GARDNER, Government Botanist.

This annual plant, which is at once both formidable and admirably constructed in its fruits for successfully grappling with the legs and feet of stock, obtaining a penetrating hold and thus effectively dispersing its seeds, has appeared in Western Australia. Wherever it has become established it has proved a serious pest to stock owners, inflicting injury on stock and occasionally causing death while spreading itself effectively through the country.

The Devil's Claw is native to the Mississippi districts of the United States of America. It is now fairly common in various parts of America, but does not appear to be as troublesome there as in the countries into which it has been introduced. The plant was first recorded in New South Wales in 1905, since when it has obtained a hold in many districts, even in the drier western parts of the State. Later it was reported from Queensland, then from Victoria, and still more recently from South Australia. In each State it has proved a menace to stock owners, especially to sheep breeders, since it clings more easily to wool than to hair. In the western districts of New South Wales it is regarded as a most serious pest, and it is claimed that sheep have died of starvation through having their mouths closed by the grappling devices of the fruits.

The fruit would appear to have been specially designed to inflict pain. The two main claws are provided with strong sharp points which curve backwards and inwards, and in addition are of the springy nature and texture of strong whalebone, so that any pressure serves but to increase the grip and deepen the penetration. Sheep feeding close to the ground have collected the fruits on their noses. The teeth-like spines of the top of the fruit are caught under the lower jaw, and the long claws grip the face, or may even penetrate into the eye sockets. Any pressure exerted by opening the mouth drives the long claws more deeply in, and extraction being impossible the fruit ultimately firmly grips the jaws, preventing their opening. Sheep are thus known to have died from starvation. In addition, the fruit easily adheres to clothing, wool, legs of animals, etc., and if there is a chance for the claws to penetrate, the anchoring teeth of the pod itself aid this pentration of the claws if any pressure is applied. It is through attaching themselves to the legs of stock and the wool of sheep that the seeds are distributed. Each pod contains about 12 to 15 seeds, most of which are freely liberated when the fruit is ripe, but some remain in lateral cavities towards the back of the fruit, and these are only freed when the fruit disintregrates.

The plant was first recorded officially for Western Australia in February of this year, when specimens were received at the State Herbarium from Cottesloe, stated to have appeared in a vegetable garden following an application of blood and bone fertiliser from Wyndham. This would imply that the species is growing in the East Kimberley district, but confirmation of this has yet to be obtained. The one plant which appeared has been destroyed, and the species proclaimed a noxious weed for the State of Western Australia. It is hoped that by this prompt recognition and proclamation as a noxious weed, it will be immediately arrested should it appear in other parts of the State. The accompanying plate gives all the details necessary for recognition of both the plant and its fruit. It has a rather characteristic aromatic scent reminiscent of Pelargonium.



THE DEVIL'S CLAW.

(Martynia Louisiana, Mill.)

EXPLANATION OF FIG.

A, Branch of plant showing leaves, inflorescence and slightly immature fruit. B, View of flower from above. C, Lateral view of flower showing calyx and bracteoles. D, Section of flower showing the four stamens and the style with its two flattened stigmatic lobes. E, Lateral view of fruit from which the fleshy pericarp has fallen. F, Anterior view of the carpels showing the orifice through which the seeds are liberated, and the spread of the horn-like "claws." G, Seeds.

All (except the seeds) about half natural size. *Icon. origin.*

Description of the Plant.

An annual summer-growing herb of somewhat procumbent habit, the branches opposite and divaricate, covered with viscid spreading hairs. Leaves opposite, on rather long and stout leaf-stalks, the blade broad-ovate or orbicular and somewhat cordate, the margins entire, undulate.

Flowers pedicellate in terminal racemes. Bracteoles close under the calyx, oblong or elliptical, deciduous. Calyx more or less inflated, with five rounded unequal lobes, and slit to the base on the lower side, hairy and fringed on the margins with rather long hairs. Corolla pale lilac to yellowish, suffused with rose-pink, large, with a broad expanded tube and expanded limb with obtuse lobes, the two upper lobes smaller than the three lower, elegantly spotted with purple in the throat and tube, and conspicuous by reason of four figures resembling anthers and filaments on the middle lobe of the lower lip. Stamens (4) well included in the tube, in pairs, with a small staminode. Ovary superior, spuriously 2-celled by reason of two intruding parietal placentas bearing numerous ovules; style long and slender with 2 small flat stigmatic lobes. Fruit an oblong capsule with a long curved beak, provided with a somewhat fleshy pericarp which falls as the two carpels separate, the beak splitting into two long curved hook- or horn-like appendages when dry, the upper margin of each carpel fringed with a crest of unequal and variously divided bristle-like processes. Seeds large, somewhat like those of the thorn-apple, black and rugose, irregularly angled or flattened.

TAKE-ALL AND SIMILAR DISEASES OF WHEAT AND HOW TO CONTROL THEM.*

H. A. Pittman, B.Sc.Agr., Plant Pathologist.

The "root-rotting" diseases of wheat known in this State as "Take-all," "Root-rot," and "Foot-rot," and which are caused by the fungi known scientifically as *Ophiobolus graminis*, *Wojnowicia graminis*, and *Helminthosporium sativum*, respectively, have of recent years become the most serious parasitic diseases in wheat crops in this State.

There are several reasons for this. Firstly, there is unfortunately no easy way known of preventing these diseases, as, for example, by the "dry pickling" of the seed with copper carbonate before sowing, as has been found very effective for the control of "bunt" or "covered smut"; nor, secondly, are resistant varieties known which can be used to combat them, as is the case with "flag smut," where such varieties as "Geeralying," "Nabawa," "Baroota Wonder," "Bencubbin," "Carrabin," "S.H.J.," etc. (see Leaflet No. 326, or this Journal pp. 214-17, June, 1931) can be used to follow a heavily-infected crop in this State with every certainty of the new crop being almost, if not entirely, free from the disease. Moreover, thirdly, the three-year rotation system, fallow, wheat, pasture, which is a firmly-established practice in many parts of the wheat belt, tends to increase these diseases in succeeding wheat crops, rather than to suppress them, for reasons which will become more obvious later on. Finally, there is a disinclination on the part of many farmers to take these diseases seriously enough in the early stages, with a consequent failure on

* This article represents the subject matter of a lecture given before the Merredin Agricultural Society by the writer on Saturday, 6th February, 1931.

their part to employ systematic methods of control. This causes a very rapid increase in the size of the areas affected by the fungi in seasons favourable to their spread.

"Root-rotting" diseases of wheat, due to various fungi, are not in any way peculiar to Western Australia. They occur to a greater or less extent in all the Australian States, and in many other wheat-growing countries, on farms where proper cultural methods are not taken to keep them in subjection.

Microscopic examination in a scientific laboratory is necessary to distinguish properly between the various fungi responsible for "root-rotting" troubles of wheat in this State, but, fortunately, from a practical point of view they may all be considered the same, as the control measures are identical for them all.

"TAKE-ALL" AND "ROOT-ROT."

"Take-all" and "Root-rot," due to the fungi *Ophiobolus graminis* and *Wojnowicia graminis*, respectively, in addition to affecting wheat in patches, which may be more or less circular in outline, also attack wheat in strips, or even individual plants scattered irregularly through the crop. Both cause a very decided, and often shiny, black discolouration or "stocking" at the base of infected stems for an inch or more, and occasionally up to three inches, above the point of origin of the main root system. This discolouration can usually be detected, on close scrutiny, by examining the bases of affected plants just as they are when pulled up from the soil, but the characteristic, more or less shiny, stove-polish-like appearance is best seen by carefully pulling the leaf-sheaths backwards and down so as to reveal the actual stem itself.

Fig. 1.—Showing root-rotting and blackening of the bases of stems and leaves of wheat plants attacked by "Take-all."

(*Photo. by Author.*)

Sometimes, and especially on infected stubble in the autumn of the year following infection, little black spine-like objects will be seen poking through the bases of the leaf-sheaths surrounding the lower portion of the stem. These are the beaks on the seed-cases of the fungi, which are formed on the inside of the leaf-sheaths and project out through the leaf tissue into the open air, so that they may the more readily eject their fungus-seeds (*spores*) when the time comes for the infection of another lot of wheat or other susceptible plants. (See Fig. 2.)

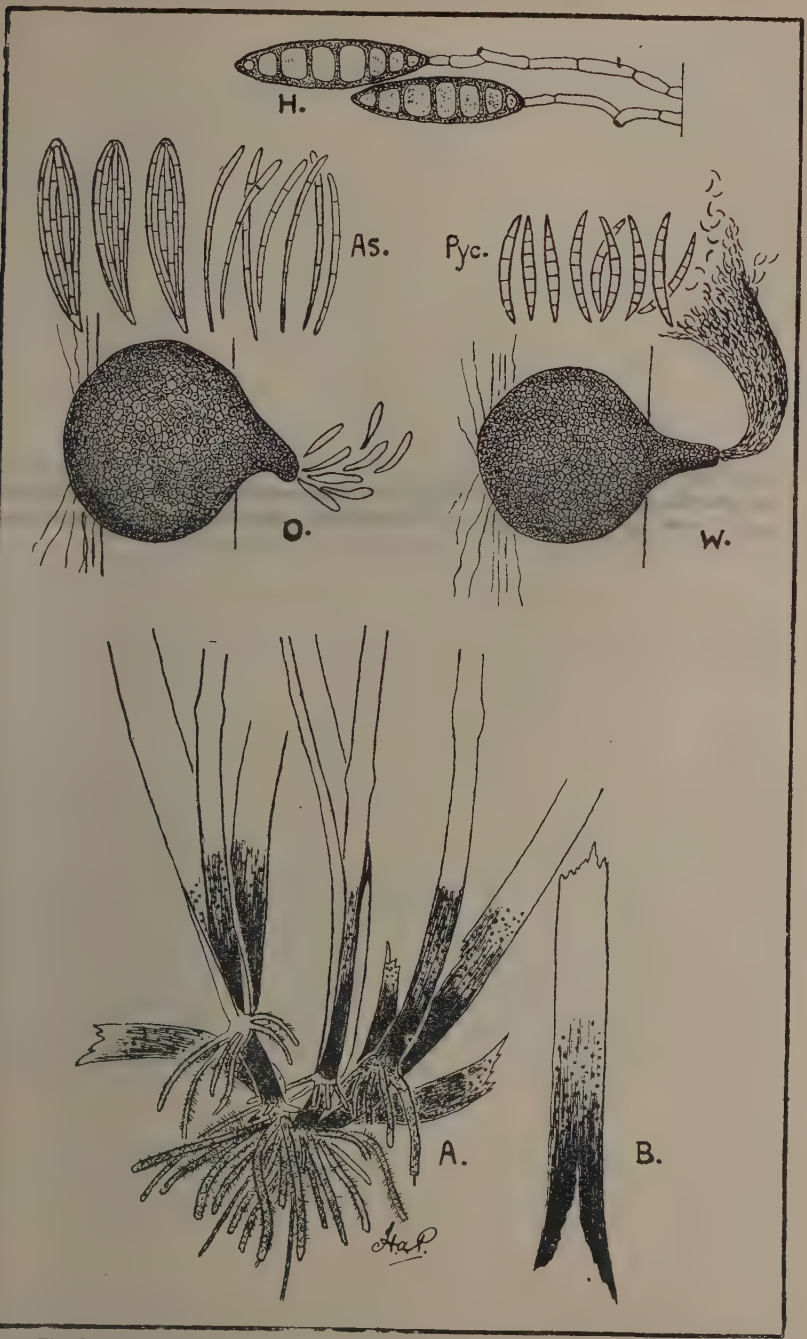


Fig. 2.—A. Wheat plant showing blackening at base of stems and inside the leaf-bases due to the "Take-all" fungus *Ophiobolus graminis*. B. Inner surface of leaf-base showing blackening and the fruiting bodies of *Ophiobolus graminis*. O. Fruiting case (*perithecium*) of *Ophiobolus graminis*, with escaping *asci*. W. Fruiting case (*pycnidium*) of *Wojnowicia graminis*. Pyc. Spores of *Wojnowicia graminis*. As. *Asci* and *Ascospores* of *O. graminis*. H. Spores of *Helminthosporium sativum*. All drawings except A and B very much magnified.

In the case of "Take-all," each seed-case (*perithecium*) contains within it large numbers of fungus-seed structures (*spores*), grouped in bundles of eight in thin sheaths called *asci*. (See Fig. 2.) When mature, and the *perithecia* are moistened under suitable conditions, the *asci* with their contained *spores* are forced out into the open. The *asci* then burst and set the *spores* in the bundles free. On germination the *spores* may attack any wheat, barley, rye, barley-grass, or other susceptible plants in the neighbourhood, and so continue the disease. In the absence of any suitable host, however, they soon die. So far as is known, all our wheat varieties are equally subject to "Take-all," but specific information on the point is unavailable. Affected plants usually show considerable root-killing, and an unusually abundant development of woolly root hairs close to the stems. Grain is rarely produced by affected plants and, if so, is small and shrivelled. Oats, under normal, good-growing, conditions, are highly resistant to this disease.

"Take-all" may be found on all types of soil. It is most prevalent during warm, moist springs, on old land sown down to wheat year after year. It is especially common also in this State in wet, poorly-drained places, and after a field has been allowed to grow up into grass. It is rare and need never be feared on intelligently farmed, well-drained properties, where early and clean fallowing, "wet sowing," abundant fertilising, shallow planting, and crop rotation are practised as routine matters of farm management.

In the case of "Root-rot," the blackish or dark-brown discolouration of the stem and insides of the leaf-sheaths is usually not so extensive as in the case of the true "Take-all" fungus (*Ophiobolus graminis*), and is more commonly found in spots and streaks, rather than generally distributed over the surface.

The root systems of wheat plants affected by either of the above organisms are always more or less rotted, brown or black in colour, and frequently very woolly, due to the excessively close packing of the root hairs, which have formed in great quantities near the butts of the roots to try and absorb sufficient water and food materials to keep the plants alive. "Fruiting bodies" or fungal seed-cases (*perithecia* or *pycnidia*, as the case may be) (see Fig. 2) may be found in both cases under suitable conditions on the diseased roots, as well as on the stems or inside the leaf-sheaths.

So far "Root-rot" has only been found in Western Australia on wheat and barley-grass. With wheat, "Take-all" and "Root-rot" are not infrequently found on the same plants. The latter disease appears to be favoured by the same temperature and moisture conditions that favour "Take-all." The spores in the case of *Wojnowicia* are produced in globular bodies much resembling those found in the case of *Ophiobolus*, but which differ in that they are smaller and may be somewhat hairy, instead of smooth, and do not have the spores produced in bundles. (See Fig. 2.) The spore themselves also differ, as can be seen from the drawings.

"FOOT-ROT."

"Foot-rot" (caused by *Helminthosporium sativum*) may be identified by the presence of one or more characteristic, isolated, light or dark brown streaks or spots near the bases of affected stalks. The base of the stem is often somewhat grey in colour, in addition to bearing the brown spots, and it frequently snaps off very easily from the butts of the roots. A musty odour may also often be detected at the base of the affected stems. The discoloured portions of the stems do not usually extend above ground. The very dark "stocking" which sheaths the base of the stem in the case of "Take-all" or "Root-rot" is quite absent with "Foot-rot." Sometimes a pinkish discolouration, due to the presence of *Fusarium spp.*, will be found at the base of stems affected with "Foot-rot." This

disease may attack the wheat plants in patches as is the case with "Take all" and "Root-rot," or it may attack isolated plants throughout the crop.

Plants may be killed out in all stages of development, and the occurrence of "whiteheads" is a common symptom. (Fig. 3.) The fungus is fortunately only rarely found in Western Australia. It has a very wide host range, and various strains may attack wheat, barley, rye, and many different grasses, including bar-

Fig. 3.—Showing wheat plants that have died of "Foot-rot," due to *Helminthosporium sativum*, in various stages of development.

(*Photo. Department of Agriculture, N.S.W.*)

ley-grass (*Hordeum murinum*) and various species of brome grasses (*Bromus spp.*). Oats have not so far been found affected in Western Australia, although same varieties are slightly affected in other parts of the world. In this State the disease has so far only been found on wheat and barley grass. Susceptible

species may be attacked on the roots, stems, leaves, ears, and grains. The disease is most serious under rather high soil temperatures, and in the presence of abundant moisture.

GENERAL CONSIDERATIONS.

The three diseases just described may all cause death of wheat plants at a very early stage in their growth, so that large bare patches may appear very early in the growth of the crop: or they may cause their death at any later stage, with consequent lack of formation of the heads; or again they may lead to the development of whitened leaves, straws, and heads without grain, or the formation of heads with very pinched grain, as the case may be.

No field survey has ever been made in this State of the relative abundance and distribution of the three separate diseases. Specimens of plants affected with "root-rotting" diseases sent in by farmers, however, are for the most part found in the laboratory to be attacked by "Take-all" (*Ophiobolus graminis*); "Root-rot" (*Wojnowicia graminis*) being very much less common, and "Foot-rot" (*Helminthosporium sativum*) only very rare.

In the field the effects of the "Take-all" fungus are usually noticed more early in the season than is the case with the other two, to which attention is more usually drawn by the occurrence of plants in patches, or scattered through the crop, prematurely "whitening-off" towards harvest time.

The stem symptoms described above serve to distinguish wheat plants affected by these parasitic diseases from failures due to water-logging, excessive salt in the soil, soil poverty, frost, or hot drying winds on improperly-consolidated, or moisture-deficient, soil.

CONTROL OF "TAKE-ALL," "ROOT-ROT," AND "FOOT-ROT."

The control measures for the three diseases are sufficiently similar to be considered identical from a practical point of view. Where conscientiously carried out little loss need be feared from any of the three over a series of years, although once they have become established on a farm there may be an exceedingly heavy loss in seasons very favourable for infection.

Unfortunately, as stated above, these diseases cannot be controlled by the use of seed treatment, as recommended by the Department of Agriculture for "bunt" or "ball smut," or by the use of resistant varieties, as recommended for "flag smut" and "rust." Their control can be summed up in the sentence, "*Starvation of the fungus and the adoption of all those cultural methods which experience has demonstrated provide for the ideal development and growth of the wheat plant.*" Disappointment will result if reliance is placed on any one method. Success will depend on the intelligent employment of the following interdependent practices.

1. **A good, clean, stubble-burn in badly-affected patches or paddocks.**—Where only small patches occur, straw from the neighbouring healthy areas should, if possible, be distributed over the diseased areas before firing, so as to make a more intense burn over the badly-affected patches. (Where the disease is serious, there is, of course, only a limited amount of stubble formed, so that the necessity for some additional material for burning is obvious.) The object of a stubble-burn is to destroy as much as possible of the diseased roots and the lower parts of the infected stems and leaves. These are the parts which carry the fungi. The latter do not die with the plants but live either as fungal threads (*mycelium*), or in *spore* (seed-like) form in the dead wheat

tissues. If not burnt, the infected parts of the stubble may be blown about the paddock and into other paddocks, especially if broken up by the trampling of sheep and horses. The headlands should also be burnt to destroy self-sown wheat or barley plants, barley grass, brome grasses, silver grass (*Festuca bromoides*), etc., which may be harbouring "Take-all," "Root-rot," or "Foot-rot."

Paddocks which have been allowed to go to pasture should preferably be burnt, when possible, before being fallowed, as the growth of such host plants as barley grass, spear grass, silver grass, and a number of other grasses, is one of the most rapid means of greatly increasing the "root-rotting" diseases on wheat paddocks.

While recognising to the full the value of a stubble-burn as an initial step in the cleaning-up of paddocks where "Take-all" and similar diseases have been allowed to get the upper hand, the writer wishes to emphasise, in no uncertain manner, that the indiscriminate and repeated burning of the stubble as a routine practice, year after year, cannot be too strongly deplored, owing to the very serious reduction in soil fertility and marked deterioration in the physical properties of the soil which may result from the repeated destruction of humus, on the content of which the fertility and good physical condition of the soil to a very great extent depend.

2. **Early Fallowing.**—The importance of this measure cannot be over-emphasised. Results of experiments at the Merredin Experiment Farm show an increase of approximately five bushels per acre on early-June-fallowed plots as against those fallowed in late August: the occurrence of "Take-all" on the early-fallowed plots being also very markedly reduced. From a disease point of view the main object of early fallowing is to plough under infected stubble and induce the fungus seeds, or spores, which are produced on the bases of the stems and roots of infected plants, to germinate. Having germinated in the moist soil, these spores must soon find some susceptible plants close handy to attack or else die of starvation.

Unfortunately, a stubble-burn does not destroy all the affected stem-bases, leaf-bases or roots, so that a burn is not sufficient in itself to effectively control these diseases. It is therefore necessary to follow up the stubble-burn by early ploughing in the late autumn or early winter, whenever possible, so as to turn the spores under into the moist soil. This does not cause them to rot, as might be supposed, but induces many to germinate. *If the first ploughing is left till the spring the soil may be too dry to induce copious germination, and many of the spores may not germinate till the following winter, thus putting back the control of the diseases for another year.* Once the spores have germinated they must find something to attack or die of starvation. This brings us to the third point in the control measures, viz.:—

3. **Clean Fallowing.**—It is absolutely essential that all growth should be destroyed by thorough cultivation, and the judicious use of sheep, in the winter and early spring, as otherwise the growth of susceptible plants on the fallows, such as self-sown wheat, barley, barley grass, etc., is simply breeding up and multiplying the various "root-rotting" fungi for the following year.

If ploughed in the late autumn or early winter, or even if left unploughed till the spring, the winter rains will have induced a more or less plentiful growth of self-sown wheat, barley grass, brome grasses, silver grass and perhaps barley. *These plants may be attacked by the spores already ploughed in, and, in such a case, unless the plants are killed out by clean cultivation, the fungi will eventually form a new crop of spores. Therefore the fallows should be kept free from all growth in the spring.* From July to November, in a cool, moist spring

er to October in more normal years, it is dangerous, from a disease point of view, for grasses to grow on infected fallows. After that the very high temperatures of the summer will usually prevent both the susceptible plants and the fungi developing.

4. **Avoidance of "dry working" of fallowed or stubble land.** Unless absolutely imperative for the eradication of weeds or the carrying out of some other essential farm operation, *it is most important that the fallows or stubble land should not be worked dry*, as under such conditions the infected stubble, which is very brittle, is broken up into numerous small pieces, which are then blown about by the wind and cause a very rapid increase in the size of the "Take-all," "Root-rot," or "Foot-rot" patches, and bring about an extension of the diseases on to hitherto clean areas. From a disease-control point of view, dry working of the fallows or stubbles cannot be too strongly condemned.

5. **Rotation of wheat with crops not susceptible to these diseases.** The growth of a crop of oats, peas, rape, lupins, lucerne, cluster clover, or any other suitable plants not belonging to the Grass Family, following the steps already discussed, viz., a good, clean, stubble-burn, and early and clean fallowing, will give another season for any remaining spores in the soil to germinate and die. Oats have not been found affected by "Root-rot" or "Foot-rot" in this State, and they are to all intents and purposes immune from "Take-all." Oats are at present the most practicable crop for rotation purposes. None of the other plants mentioned above is subject to any of the three diseases.

After the rotation crop the paddocks should preferably be early- and clean-fallowed before again coming back into wheat.

6. **"Wet-Sowing,"** i.e., sowing wheat after the commencement of the autumn rains, not before, when the season allows, gives any fungus spores that may still remain in the soil a further chance to germinate and die before the wheat is sown or germinates.

The variety selected should be planted as *late* as is permissible for the district according to the recommendations of the Wheat Branch of the Department of Agriculture. It is advisable to choose an early or very early maturing variety for planting on paddocks where serious losses from "Take-all," "Root-rot," and "Foot-rot" have been experienced, because these varieties can be planted later with safety than is the case with later-maturing varieties.

7. **Heavy dressings of superphosphate.**—As much superphosphate should be used on "Take-all" patches or paddocks as the farmer can afford, as the "Take-all" fungus is definitely suppressed by any substances which tend to increase, even temporarily, the acidity of the soil. Moreover, extra superphosphate stimulates a vigorous rooting system and induces very considerable disease-resistance, so that the plants are very much better able to resist the attacks of the "Take-all," "Root-rot," and "Foot-rot" organisms. These diseases are always very much more serious on wheat plants which have been weakened in any way, such as by the water-logging of the soil, too deep planting of the seed, severe frosting during the spring, or too little use of superphosphate.

It has been shown by Kirby in America (Cornell Uni. Agr. Expt. Sta. Memoir. 88, 1925) that, although "Take-all" can be grown in artificial media with a wide range of acidity or alkalinity, it prefers somewhat alkaline conditions.

During the 1931 season it was found at the Merredin Experiment Farm that where "Gluyas Early" wheat had been planted across a "Take-all" patch

without superphosphate the wheat was a failure. Where 75 lbs. of superphosphate were used "Take-all" was serious. Across the same patch where 150 lbs. of superphosphate were used very little "Take-all" could be found, even on close scrutiny.

8. **Good drainage** is essential on heavy forest country, as where the water tends to lie on the surface for any length of time the effects of the three fungi herein discussed are always very much more severe than on well-drained land.

9. **The wheat seed should be planted on a very well compacted seed bed,** about $1\frac{1}{2}$ to 2 inches deep. This is very much more important than many farmers realise. The thorough preparation of the seed bed, so that there is at seeding time a very firm seed bed about $1\frac{1}{2}$ inches below the surface mulch, is one of the most important factors in ensuring a good even germination and the development of strongly-rooting, abundantly-vigorous, disease-resistant plants. The sowing of wheat on a properly consolidated seed bed stimulates vigorous root development, and by giving the plants a good start in life tends to render them more resistant to the inroads of the fungous diseases herein discussed.

If planted deeper than about $1\frac{1}{2}$ inches, considerable time and energy is wasted by the young seedlings in developing their permanent root system at the $1\frac{1}{2}$-inch level, which they will always do no matter how deeply the seed is sown. If the permanent root system is thus forced to develop in a very poorly compacted and over-aerated region of the soil, the resistance to "Take-all," "Root-rot," and "Foot-rot" is very greatly lowered.

10. **Do not feed-off crops on affected land,** as the reduction in the vigor of the plants which is caused by this practice will result in any "Take-all," "Root-rot" or "Foot-rot," which may be present, causing a very much greater loss of yield than would be the case had the crop not been fed-off. These diseases can be present on wheat plants without doing them any very great amount of damage, if the infection is only slight, but anything which reduces the vigour of the plants may allow the fungi to get the upper hand. Similarly, anything which will tend to increase the vigor of the plants will tend to cause them to throw off these diseases.

11. **If cutting infected crops for hay, set the reaper and binder to cut not closer to the ground than four or five inches,** so that diseased tissues will not be spread about the farm on the hay, chaff, or in the droppings of animals.

12. **Avoid the dumping or stacking of bags containing wheat or chaff in bare patches in the paddocks caused by "Take-all" and similar diseases** as small pieces of infected material may become caught up in the fibres of the bags and be distributed in that way to other parts of the farm, or to new farms, later on.

13. **Finally, on no account should paddocks affected with "Take-all," "Root-rot" or "Foot-rot" be allowed to go to pasture.** Such a procedure does not tend to remedy the position but only makes the diseases worse, as most of the grasses which grow up on pasture land, such as barley grass, spear grass, silver grass, etc., become infected with the diseases without actually being seriously injured themselves. Pasture on "Take-all," "Root-rot" or "Foot-rot" patches or paddocks therefore makes the diseases worse, instead of better, when wheat is again grown on those areas. It is very much better, from the disease point of view, to adhere to a two-year rotation, i.e., fallow, wheat, fallow, wheat, than to adopt the three-year rotation, fallow, wheat, pasture, where "Take-all" and the similar diseases exist.

To let an infected area go to grass does not only not check the disease on that area, but it is liable to infect adjoining areas through infected fragments of the grasses being blown about by wind, or carried to them on the implements or by stock, etc. (See Fig. 4.)

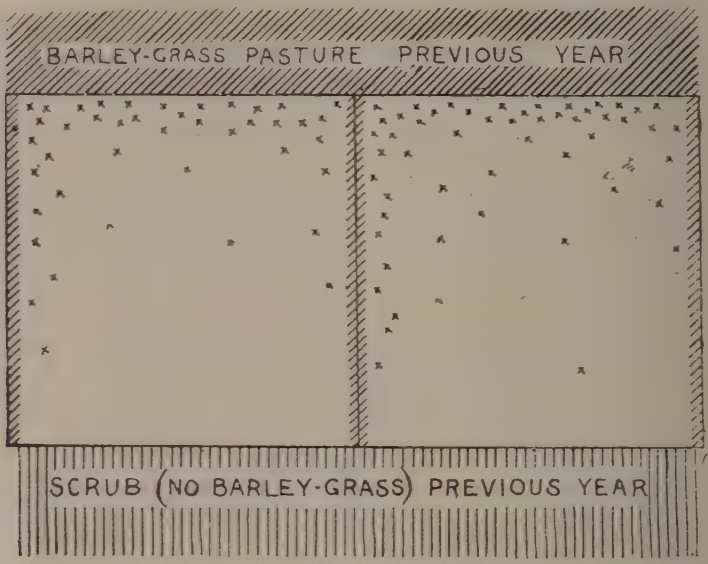


Fig. 4.—Diagram illustrating the manner in which two fields were affected with "Take-all." The crosses indicate the distribution of "Take-all" patches, but are not accurate plottings.

(*After G. Samuel, "Take-all Investigations. 2." Journ. Dept. Agric. S. Aus., July*, 1924, *pp.* 1134-1147.)

After breaking up grass paddocks the first crop should be oats, where possible, not wheat.

14. **Never plant discoloured, shrivelled seed,** as "Foot-rot" may cause such symptoms and be introduced on to new areas in infected seed.

15. If it is ever absolutely necessary for any reason to plant wheat after "Take-all," "Root-rot" or "Foot-rot," without the intervention of an early, clean, fallow, such as recommended above, the best methods are:—Stubble burn, thorough preparation of the seed bed *after rain*, shallow planting, the planting of early-maturing varieties as late as is permissible for the district according to the recommendations of the Wheat Branch of the Department of Agriculture, and heavy applications of superphosphate.

If all the above recommendations are carried out conscientiously—and many of them are simply practices which should be carried out in the ordinary routine of good modern farming, quite apart from all considerations of disease—"Take-all," "Root-rot" and "Foot-rot" will be very greatly reduced in amount if not entirely eliminated from the wheat fields.

It is very much better, in every way, to farm a smaller area thoroughly than a larger area in a skimpy and slip-shod manner.

REVIEW.

"THE USE OF FERTILISERS IN TROPICAL AND SUBTROPICAL AGRICULTURE,"

By A. Jacob, Ph.D., and V. Coyle, M.Sc., 1931.

Statistics show that generally those farmers using most liberal dressings of fertilisers are most successful in agricultural practice. In view of the low prices for agricultural products ruling to-day and the need for the dissemination of information concerning fertiliser practice, Jacob and Coyle have assumed the task of preparing a handbook on this subject for the use of planters in order to raise the productivity of the soil and improve the quality of the produce. A representative literature has been used in reference.

Part 1 deals with the theory and practice of fertilisers and fertiliser experiments.

Contrary to general notions of those outside the tropics, it is observed that many soils in tropical and subtropical regions are inherently of low fertility owing to extreme leaching under high temperature conditions. The need for organic and inorganic fertilisers is suggested and the position with respect to a wide variety of crops is studied in Part 2.

In Part 2 the authors elect to prove that "rational manuring with artificial fertilisers" will be "an effective help for the solution of the big problem of reducing the planter's cost of production." From a consideration of the amounts of nitrogen, phosphorus and potassium removed from the soil by various crops, a knowledge of the physiology of the plants and a selected number of experimental results, recommendations are made for the guidance of planters. It is not claimed that the mixtures recommended will suit all conditions, but they are given to assist in the laying out of experiments on the individual holdings to determine local requirements.

Practically all of the experiments cited show the value of "complete" fertilisation and considerable emphasis is given to the return from the use of potassium in the mixtures. It is open to question whether many of the experiments described were sufficiently controlled to warrant the conclusions derived.

The book is not a contribution to the scientific aspects of fertilisers—it is not intended to be so—but it is a useful guide for the use of planters and farmers interested in understanding fertilisers and in improving the fertiliser practice as a means of lowering production costs.

L. J. H. TEAKLE.

25/1/32.

RELATIVE FOOD VALUES.

G. K. BARON-HAY and L. C. SNOOK.

Although figures relating to the Cost of Production of Milk and Butterfat appearing elsewhere in this *Journal* indicate that an effort should be made to grow all foodstuffs on the farm, during the summer months it is sometimes necessary to purchase considerable quantities of concentrated foodstuffs, in order to maintain the milk production of herds. It is difficult sometimes to decide which type of foodstuff to buy.

For many years bran was considered an indispensable constituent of the summer ration and was purchased in regular quantities, whatever may have been its price relative to that of other foodstuffs. In recent years, however, dairy farmers have learnt that other concentrates may successfully replace bran, the deciding factor being one of cost only. Oaten and wheaten grain, peas, and linseed meal mixed in various proportions may be used as substitutes for bran.

To aid farmers in deciding which concentrate to purchase, the following table has been drawn up. The table shows the current price of each food and the value per food unit.

Relative Values of Concentrates for Dairy Cattle, 1st March, 1932.

Food.	Cost—1-3-1932.	Digestible Protein in 100lb. of Foodstuff.	Food Units per 100lb. of Foodstuff (Wood.)	Cost of 100lb. of Foodstuff.	Cost per Units of Protein.	Cost per Food Unit.
		lb.		s. d.	d.	d.
Wheat	3s. 4d. per bus. (60lb.)	9·0	72	5 6½	7·4	0·93
Oats	2s. per bus. (40lb.) ...	7·0	60	5 0	8·6	1·00
Bran	£5 10s. per ton ...	9·0	50	4 11	6·5	1·18
Meggitt's Meal ...	£12 10s. per ton ...	26·0	76	11 2	5·0	1·76
Peas	5s. per bus. (60lb.) ...	17·0	72	8 4	5·9	1·19
Meatmeal ...	7s. 9d. per bag (50lb.)	40·0	62	15 6	4·65	3·00

The nature of the concentrate required will vary. A farmer may have ample supplies of cereal hay (say, 1½ tons per cow), cereal silage and a little dry picking in his paddocks. The milch cows on such a farm will require a protein supplement, and the figures given in the table showing cost per unit of protein will prove of value. It will be seen that at the present time linseed meal is—with the exception of meatmeal—the cheapest source of protein. As linseed meal is an ideal supplement to a ration of cereal hay and silage, its present cheapness warrants its use.

Meatmeal originally was placed in the table as being of probable value to pig-raisers, but there does not appear to be any reason why meatmeal should not be used as a protein supplement for cows. Theoretically, meatmeal should be ideal for this purpose, as it contains—in addition to the protein—about 40 per cent. of mineral matter (as calcium phosphate), likely to be of great value to a lactating

cow or growing calf. The fat present (about 11 per cent.) would render meatmeal unpalatable to cows if fed in quantity, but such excessive feeding is not likely to occur in practice. It would be very interesting to test the value of meatmeal as a concentrate for dairy cattle, and it is hoped that it will be given a trial. It is the cheapest protein concentrate on the market at present.

Peas at 5s. per bushel is also a cheap protein food. They are included here, not as an indication that peas should be purchased but to stimulate the growth of peas by the farmer. A few acres of field peas are a splendid asset on any farm. With good cultural methods 20 to 30 bushels of grain per acre should be obtained, and the pea culms remaining will prove a valuable addition to the reserve of hay. Ten acres of peas yielding 20 bushels per acre will supply enough grain to feed 3 lb. per head per day to a herd of 20 cows for six months. Crushed peas are an ideal supplement where a farmer feeds good chaff and silage.

At £5 10s. per ton, bran is a cheap protein food. As it has other well-known virtues, being laxative and stimulative of milk flow, its use is quite economic at this price.

Oats appear expensive—indicating that oats should be grown on the farm. Oats are a splendid food for stock, but at present rates (2s. per bushel) are expensive to buy.

Now that the growth of clovers and similar protein rich fodders is becoming so general, and the conservation of clover hay is part of standard dairy farm practice, the need for a protein rich supplement is not so widespread. It is often necessary, however, to feed some concentrate to high producing cows. Under such circumstances, the value of the concentrate will not depend on the protein content alone but also on the total food value—the number of palatable, easily digested food units per pound of purchased foodstuff. The last column of the table shows the various foods evaluated under this heading. It will be seen that linseed and meatmeal, purely protein foods, are far too dear for use in this class. Wheat is the cheapest and is certainly more economical to purchase than poor quality oats. Crushed wheat is a suitable food for dairy cows, but should not exceed one-third of the grain ration. Good oats at 2s. per bushel are not much dearer than wheat. Bran is an expensive supplement to a clover hay ration, and, like linseed meal, should be used only to counteract a shortage of protein.

Meatmeal is the cheapest and best source of protein for pigs, and is the correct supplement for a grain ration. It has the added advantage of supplying necessary minerals lacking in a cereal grain diet. 3 lb. of crushed wheat and 4 ounces of meatmeal will supply all the requirements of a 50 lb. pig growing at the rate of 1 lb. per day. This ration now costs about 2½d. per day.

It is intended that a similar table to that discussed in this article will be printed in future copies of the *Journal*. It is hoped that reference to it will aid farmers, who have to purchase concentrates, to buy that which is cheapest at current market rates.

BACTERIAL BLIGHT OF BEANS.

DISEASE-FREE SEED AND DISEASE-FREE SOIL ESSENTIAL FOR CONTROL.

H. A. Pittman, B.Sc.Agr., Plant Pathologist.

Prior to the 1930-31 season the "Canadian Wonder" bean crops (*Phaseolus vulgaris*, L.) in this State had always been, so far as is known, quite free from any bacterial disease. In November, 1930, however, complete losses of crops of this variety were caused at Maddington by a disease which was readily diagnosed as a "bacterial blight," although, owing to pressure of other matters, no opportunity has as yet occurred of definitely identifying the bacterium concerned. It would appear, however, that at least the major part of the losses was due to *Phytomonas medicaginis* var. *phaseolicola*. The seed from which these crops were grown had been obtained from Orbost, Victoria, where a huge, and, up till then, extremely satisfactory bean seed-raising industry had been established.

Shortly after the first outbreak of the disease in this State, news came to hand, per medium of the Eastern States press, that total crop failures had been reported during the 1930-31 season from South Australia and many parts of Victoria, due to the ravages of a bacterial blight. A similar, and perhaps the same, disease, caused by *Phytomonas medicaginis* var *phaseolicola*, has since been reported from New Zealand (W.D. Reid, N.Z. Journ. Agric., Vol. 43, No. 6, Dec., 1931, pp. 408-415), and Queensland (L. F. Mandelson, Queensl. Agric. Journ., Vol. 37, Part 2, pp. 128-33, Feb. 1932), and a bacterial blight has led to very severe losses in the big bean-growing district of Gosford, New South Wales.

Samuel (Journ., Dept. Agric., South Aus., Vol. 34, No. 7, Feb., 1931, p. 746) records a bacterial spot of beans in South Australia as being probably due to *Phytomonas medicaginis* var. *phaseolicola*.

Since the first occurrence of the disease in this State very severe losses have occurred at Nedlands in extra early crops of "Canadian Wonder" beans, and also of the same variety at Geraldton, Balcatta, Spearwood, and other places.

The seed-raising industry at Orbost, Victoria, has been completely disorganised, and the Victorian and New Zealand Departments of Agriculture have instituted Seed Certification Schemes in an endeavour to provide seed buyers in the future with disease-free seed.

Investigations under way by the Department of Agriculture in Victoria, according to a letter from the Plant Pathologist, Mr. D. B. Adam, include varietal resistance trials, seed treatments, spraying and dusting experiments, the use of aged seed, and various systems of rogueing.

SYMPTOMS OF THE DISEASE.

On entering a field severely affected with bacterial blight, the first impression gained is that the germination has been very irregular, and that the affected plants are suffering from nitrogen starvation combined with the effects of an exceedingly severe drying wind, although it may be very well known to the observer that neither of these things could possibly be the cause of the trouble. In a number of patches where the disease obviously first appeared, all that is left of the affected plants will be a few stiff stems with shrivelled and dried-out leaflets still hanging to, in some cases, or else fallen from, the leaf stalks or petioles, which usually remain stiffly erect. A number of the plants may have grown little, if any, further than the seed-leaf stage.

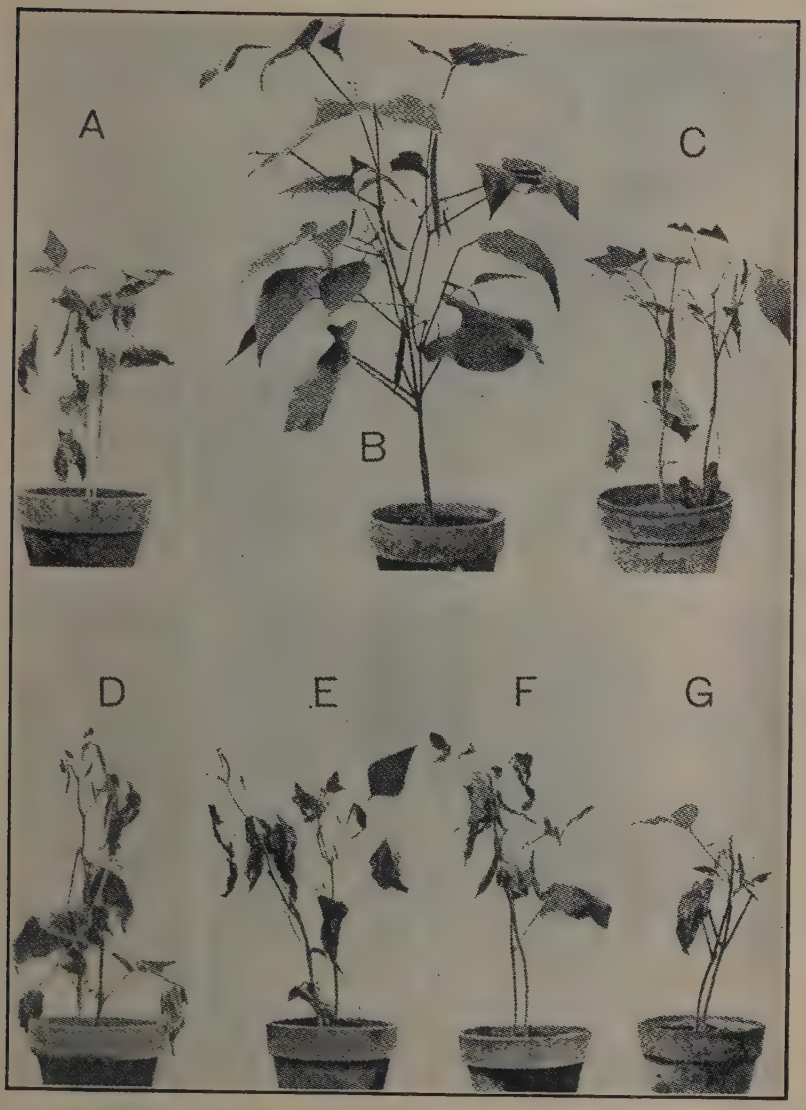


Fig. 1.—Wilts of "Red Kidney" bean plants one month after inoculation with various bacterial pathogenes.

The plants were inoculated at the first leaf node. A, *Phytomonas medicaginis* var. *phaseolicola;* B, check; C, *Phyt. phaseoli* var. *fuscans;* D and E, two strains of *Phyt. phaseoli;* F and G, two strains of *Phyt. flaccumfaciens.*

B represents a perfectly healthy uninoculated control plant photographed on the same scale as the others.

(*After Burkholder, "The Bacterial Diseases of the Bean," Cornell University Agric. Expt. Sta. Memoir* 127, *April*, 1930.)

A number of the leaves may have fallen away from the plants at the abscission layer near the base of the leaf-stalk (petiole), while in other cases the leaflets will have dropped off with their own stalks (petiolules), leaving the petioles projecting stilly into the air. The swellings at the base of infected petioles may be very much watersoaked in appearance and still quite green, even though the end of the petiole is browned and shrivelled.

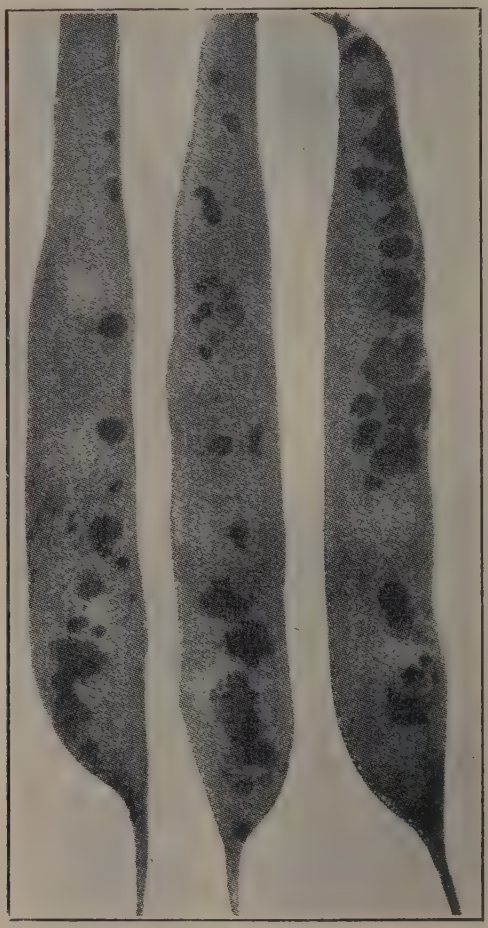


Fig. 2.—Pods of "Red Kidney" bean showing lesions caused by *Phytomonas medicaginis* var. *phaseolicola*. (*After Burkholder, "The Bacterial Diseases of the Bean," Cornell University Agric. Expt. Sta. Memoir* 127, *April*, 1930.)

If the weather conditions are moist at the time, or if the plants are growing in a very moist situation, or have been recently heavily watered with a sprinkler, beads of bacterial slime may be found exuding from the nodes on the stem, just below the bases of the petioles, or from the wounds left by the falling away of the leaflets, leaves or cotyledons (seed leaves). Elongated,

very irregular, slightly sunken, brown lesions with a reddish-brown margin may occur on the stem, and a more or less complete brown girdling of the stem with a reddish margin and considerable bacterial ooze may be located at the point where the seed leaves were formerly situated. Some of the leaflets which have not yet dried out may show a considerable number of rusty-brown, more or less confluent, small irregular lesions between the veins, the remainder of the leaflet having a very sickly, nitrogen-starved, mottled appearance. Such leaves are frequently very ragged at the margins and "shot-holed" in appearance. Small, dark-green watersoaked, or dead, areas may occur on the leaflets, each spot being surrounded by a comparatively enormous pale-green halo.

Affected pods may show one to very numerous more or less circular dark-green watersoaked lesions, from which bacteria may exude in beads in moist weather, in a very moist situation, or when placed for a day or so in a moist jar.

These areas later on may dry out and become more or less reddish or brown in colour. The diseased areas may run together and cause malformation and withering of the infected pods.

Early sown and late autumn crops are generally the most severely affected, as the cool, moist, atmospheric conditions are more favourable for the spread of the disease than hot, dry, conditions. The danger from bacterial blight is greatest in the localities which would otherwise be the most suitable for the production of very early crops, that is in the frost-free coastal areas and picked spots close to the Swan River or other favoured locations. The disease is apparently spread about in the field from the primarily-infected plants by driving rain, hail, overhead watering, insects, or cultivation and harvesting operations when the plants are in a moist condition. The spread of the disease in the field under suitable conditions may be exceedingly rapid.

CONTROL.

The disease is carried by the seed, and the only known control measure is to plant seed harvested from disease-free crops, on new land, or land that has not grown an infected crop for at least three years.

Since infection is not only carried on the outside of the seed, but actually in a number of cases inside the seed coat, seed disinfection is impossible, as any treatment severe enough to kill the bacteria within the seed coats would also kill the seed.

The appearance of the seed may give no indication as to whether the disease is present or not, as perfectly healthy-looking seed may be carrying sufficient infection to give total crop failure under suitable climatic conditions.

Bacteral blight can only be detected with any degree of certainty in the seed by a long and tedious laboratory investigation, or, better still, by actually growing a representative sample of the seed in disease-free soil prior to the planting of the bulk, and carefully observing the test seedlings for any signs of disease. In the seedlings bacterial blight may be recognised as small diseased spots which develop on the cotyledons (or seed leaves), which are attached to the top of the stem when the seedling stem appears above ground.

In view of the serious result that will almost inevitably attend the introduction of even a small percentage of infected seed on to a property, **growers who know that their land and crops are clean are strongly advised to raise their own seed, even though it may be contrary to their practice and inclination to do so.** It is important to remember that bacterial blight is carried almost solely by the seed, and properties that are now clean may therefore be kept so perhaps indefinitely by the expedient of planting only clean seed.

Clean seed may perhaps be obtained from an originally diseased line, by growing a crop during the hot dry weather, provided that artificial waterings, if necessary at all, are kept down to the irreducible minimum, and that the diseased plants are pulled out and burnt as soon as noticed. Frequent inspections should be made as soon as the seed has germinated, and any weak or sickly plants, as well as plants with spotted seed leaves, or with blight spots on the leaves or stems, should be carefully removed and immediately destroyed by fire or boiling. Bean plants should never be worked amongst when any moisture is present on the leaves, as infection may easily be spread in this way.

Growers whose crops are infected should burn all diseased plants, and should not plant the infected land to any variety of beans for at least three years.

Regarding varietal susceptibility, Dr. R. J. Noble, Biologist, Department of Agriculture, New South Wales, in a letter to the writer dated 13th November, 1931, says—

"Bacterial blight of bean has been very prevalent in this State during the last two seasons, and at present is so widespread in 'Canadian Wonder' crops that only limited supplies of beans are reaching the market. The disease first came under notice in this State in 1928.

"Field observations have been made by this Department on relative resistance in about 200 varieties and selections of beans for two seasons, *but no variety has shown outstanding resistance.*

" 'Kentucky Wonder' and 'Epicure' pole beans have been among the most resistant.

"Most lots of 'Canadian Wonder' bean seed on the New South Wales market at present are infected to a greater or lesser extent, but most of the fancy beans are blight-free so far . . . . . It is understood that most of the seed of the fancy types is imported from overseas.

"It is considered that beans will continue to be a very unsafe crop until disease-free seed can be raised."

Mr. D. B. Adam, Plant Pathologist of the Victorian Department of Agriculture, in a letter to the writer dated 16th November, 1931, advises that—

". . . . . field observations suggest that the green bush beans 'Pale Dun' and 'Feltham's Prolific' are more resistant to bacterial blight than the 'Canadian Wonder.' The green bean trade is not so keen on these varieties because the pods in the case of 'Pale Dun' are smaller, and in the case of 'Feltham's Prolific' less fleshy than those of 'Canadian Wonder.'

"Among waxpod or butter beans we find that the 'Startler,' though certainly not immune from bacterial blight, is fairly resistant."

So far we have only experienced bacterial blight on the "Canadian Wonder" in Western Australia.

In conclusion, I cannot too strongly emphasise that unless growers can obtain absolutely disease-free seed (as for example seed certified by a Government Department of Agriculture to be blight-free), and plant it on disease-free soil, they would be very well advised to give up growing "Canadian Wonder" beans altogether, and confine their attention to the other varieties mentioned above as being somewhat resistant. Even then, large-scale planting should be avoided, except with seed known to be disease-free, as in view of the seriousness and rapidity of spread of the bacterial blight disease, bean growing is at present, under any other conditions, far too much of a gamble. The advice given above applies particularly to early or late-planted beans. There were many failures last season owing to neglect of this advice.

PERTINENT TOPICS.

Geo. L. Sutton,
Director of Agriculture.

THE AUTUMN WORKING OF NEGLECTED AND OTHER FALLOWS.

The effects of low prices and the general depression have been reflected in some of the land which has been fallowed, or rather, imperfectly fallowed, for seeding during the current season. In many instances the initial breaking up of the land, the thoroughness of which is important, has not always been well done and the consequence is that the ground in some cases is very rough, and in most cases is covered with dry weed growth or filled with weed seeds.

The treatment which this land will receive between now and seeding will have a very material effect upon the yield of the resultant crop, and there are some who fear that such land is hardly worth cropping. This, however, is not the case, for, whilst the land so treated may not have the maximum amount of moisture stored in it, nor contain all the available nitrogen which good fallow has, yet it is to be remembered that, usually, poor fallow is better than no fallow at all, and provided the ante-seeding treatment is such that it controls the weed growth and tends to consolidate the seed bed, good crops consistent with the quality of the land and the character of the season are possible.

The natural agencies of rainfall and time will tend to bring about consolidation. If the ground is lumpy some assistance should be given by the cultivation of the soil to break up the lumps. This work can be done even before the rains come, provided the implements available are such as will enable the land to be dealt with effectively should it be hard. If the ground is at all loose, the springtyne cultivator is very suitable for this purpose.

No amount of cultivation whilst the ground is dry will, however, destroy the weed growth which will subsequently result from the seeds which are now in the seed bed, for it must be remembered that, fundamental to practical methods for the destruction of weeds, is a recognition of the fact that though weed seeds cannot be destroyed by cultivation, the weeds resulting from the germination of these seeds can easily be destroyed in their early stages. To make use of this fundamental fact, one must wait until the rains come, to allow sufficient time for the seeds to commence germinating, and then commence cultivations so as to destroy the plants resulting from such germination.

The cultivation for the destruction of weeds must be very thorough, and must be done by implements which are suitable for the purpose, and which, in addition to thoroughly working the soil, will destroy weed growth. Whilst the weeds are young and the ground is soft, the springtooth cultivator, with wide points, is quite satisfactory, provided the workmanship is good, but, as the weeds become more developed or the ground becomes hard, this implement will be less effective, and other machines designed for heavier conditions will have to be used. Because disc implements have a tendency, particularly on clay land, to make the ground too fine on the top, and then eventually to "set," a rigid tyne "duckfoot" or share cultivator is preferable to the disc.

A single cultivation after rain is, however, not all that is necessary, for the result of the first cultivation, while destroying one batch of weeds, is to bring about conditions which will help the growth of weed seeds not previously germinated, and so a second cultivation, preferably at right angles to the first, at a later date, say a week to a fortnight later than the first, is advisable in order to ensure a clean seed bed which is so essential to good yields. This second cultivation can take place and usually does take place immediately prior to seeding.

Whilst each cultivation should be thorough, it does not necessarily follow that it should be deep. A good even mulch of two inches is sufficient at this time. Deeper cultivations should be avoided because such bring weed and disease seeds to the surface layers where the conditions for germination are more favourable, whereas if left in the deeper layers most, if not all of them, would have remained dormant.

Summed up, the treatment to give these neglected fallows in order to secure the best results from them is:—

(1) If rough, to cultivate them prior to the autumn rains, and

(2) Wait for the rains, then thoroughly cultivate 1½ to 2 inches deep a few days after the first rains, followed by a second cultivation, about 1½ inches deep, from a week to a fortnight later, immediately prior to seeding.

"TAKE-ALL" AND OTHER CEREAL ROOT ROTS.

The Importance of Wet Cultivation Prior to Seeding for their Control.

Of the several cultural operations which are necessary to control the disease known as "Take-all," the importance of timely wet cultivation just before seeding cannot be over emphasised. This is the semi-final link in the chain of protection, and is the more important when some of the preceding links in the chain have only been imperfectly dealt with.

On most farms it is probable that, in the autumn, the soil contains more or less spores or seeds of the "Take-all" fungus which are lying dormant, ready to start into activity with the first seasonal rains. These fungus seeds or spores have to be treated very similarly to the seeds of weeds, inasmuch that cultivation will not kill them whilst they are in the form of spores, but the desired result can be achieved, as in the case of weed seeds, by allowing them to germinate and then destroying the host plants to which they may have attached themselves. Obviously, as the fungus is a parasite, the germinated spore will perish unless it becomes attached to a host plant.

To control any of these "Take-all" diseases it is essential to delay seeding until the rains come and allow the spores an opportunity of germinating, attaching themselves to the host plants, a process which only takes a few days, and then to cultivate the ground so as to destroy the host plants or weeds and the fungus at the same time. This, however, is not quite sufficient, for recent investigations have indicated that the mycelium of the disease which, in infected plants, is found on that portion of the stubble below the surface of the ground, as well as on the bases of the stems above ground, is carried over the summer in a dormant condition. With the advent of the autumn rains this bursts into activity, throws out spores and they in their turn are a second source of danger until destroyed. They can be destroyed, as were the first spores, after they have germinated and attached themselves to some host plant such as barley grass or self-sown wheat. For this purpose a second cultivation is necessary, just as the second cultivation after rain is for the destruction of wild oats or other weeds. The double cultivation after rain, which is so beneficial and essential for the control of weeds on "dirty" fallows is also one of the important factors in the control of "Take-all" diseases.

The final link in the chain of protection is the liberal application of superphosphate with the seed, for it has been found that this brings about a soil condition, immediately around the seed, unfavourable to the growth of the fungus.

A double cultivation after rain will, in most seasons, necessarily delay the planting and will force the farmer to plant mid-season and early varieties. Where

"Take-all" and similar diseases are troublesome, the varieties chosen should be planted as late as is permissible for each variety in accordance with the recommendations of the Department.

DI-CALCIUM PHOSPHATE—A NEW LOCALLY MANUFACTURED PHOSPHATE FOR STOCK LICKS.

The absence, or a deficiency, of any essential ingredient in their food, is likely to cause a depraved appetite in stock. Experience has shown that in this State a depraved appetite in cattle and sheep is almost invariably due to phosphorus deficiency. From the reports which have reached this Department, it is probable that no single disease in this State makes a greater toll upon productivity of our stock, or has a greater death roll, than that due directly and indirectly to an insufficient quantity of phosphorus in their food. In the case of dairy cattle, one of its outward signs is depraved appetite and consequent bone chewing, and it is responsible for losses due to Toxic paralysis or Botulism, formerly known as impaction or "dry Lible," and also, in some cases, to sterility. With sheep, a very common visible sign is the eating of rabbit carcases or other debris due to the craving consequent upon the deficiency in the diet. The result of the deficiency is reduced wool productivity, general debility and frequently death. The death is often wrongly ascribed to eating the poison which the rabbits ate and which caused their death. This, however, is not so. The death of the cattle or sheep is indirectly the result of the phosphorus deficiency in the food the animals are receiving, combined with the presence of an organism, known as *B. botulinus*, found in the bones chewed or licked by the animals, and also in the rabbit carcases or other debris for which the animals have a craving. This craving is due to the phosphorus deficiency in the food, and when the animals satisfy it by eating the rabbit carcases, etc., they also ingest the organism and this sets up the trouble which in many cases results in death. Even though the Botulinus organism may not be present in the bones or debris and so cause death, the health of the animals is seriously affected by the deficiency of phosphorus and the productivity of the animal is reduced.

For hygienic reasons the carcases should be burnt or buried, and, for the general health of the stock, the phosphorus deficiency should be remedied and the depraved appetite and craving prevented. This can be done by providing, either in the feed or as a stock lick, some phosphatic compound such as ground rock phosphate, superphosphate, sterilised bone meal, basic superphosphate, etc. Though all these and others are suitable, they are not equally suitable. Their relative position is summed up by Sir Charles Martin, Chief of the Institute of Animal Nutrition, as follows:—

It does not signify what form of phosphate is contained in the lick, provided that sufficient is absorbed into the animal system, and the other ingredients are not harmful. The amount absorbed depends, apart from the content—(1) on its availability, and (2) palatability.

Availability is decided by the state of subdivision, solubility in digestive juices of varying hydrogen ion concentration, and some physiological factors not yet understood.

The availability for cattle of a number of phosphatic materials has been roughly estimated by Theiler and Du Toit in South Africa by finding out the amount required to cure in two months the craving for bone-chewing in oxen, in which the habit was well established.

* * * * * *

As far as I can gather from the analysis of the records of their experiments, a daily dose of about 15 gms. (½ oz.) "Phosphoric acid" in the form of either orthophosphoric acid, di-sodium phosphate, di-calcium phosphate, commercial superphosphate, or bran was adequate. Of bone meal, 30 gms. (1 oz.) "Phosphoric acid" was necessary; of rock phosphate (probably Moroccan) 40 gms. (nearly 1½ ozs.) was insufficient, and South African rock phosphate from Saldhana Bay was of no use.

* * * * * *

However, when all is said and done, the readiness with which the animal will avail itself of the lick provided controls the situation. This can be determined by field experiments, but there is already a good deal of general experience to draw upon.

Experience gained at our field-stations at "Dismal Swamp," Kangaroo Island and "Meteor Downs" indicates that sheep consume bone meal and di-calcium phosphate mixed with salt readily in the dry season; ground Nauru phosphate less readily, but enough is eaten to supplement the diminished phosphorus in the herbage during the dry weather. Nauru phosphate was recommended by Brunnich and is now extensively used throughout Queensland with, I understand, satisfying results. At "Meteor Downs" it is consumed by our sheep in apparently sufficient amounts, little when the grass is green and a good deal when the paddocks are dry. It is cheaper than bone meal or di-calcium phosphate, but the greater content of "Phosphoric acid" and greater availability of the last mentioned more than compensates for the extra price. Super and glycerophosphate sheep appear to dislike, though they will eat them if hard put to obtain a supply of phosphorus.

From the above it will be seen how very desirable it is to have on the local market a phosphatic material of such high availability as di-calcium phosphate. In this connection it is interesting to record that, three years ago, in a short article "Phosphatic Licks for Stock," published in this Journal (December, 1928), the author, when referring to the need of a suitable phosphate for licks in Western Australia wrote—"It is believed that this will be supplied in the future by a specially prepared precipitated calcium phosphate." This belief has now been realised, and in response to the Departmental request the Cuming Smith-Mt. Lyell Fertiliser Co. are now manufacturing a high grade di-calcium phosphate suitable for use in the preparation of phosphatic stock licks, and are placing same on the market.*

In addition to its availability, another very distinct advantage of di-calcium phosphate is its high quality, containing as it does some 40 per cent. of "phosphoric acid." This will enable a very palatable lick, and, at the same time one of high grade quality, to be prepared, even when a comparatively large amount of salt is used. This has been a difficulty in the past as some of the phosphatic compounds, in order to be rendered palatable, require so much salt or other medicants to be mixed with them that the quantity of "phosphoric acid" is unduly low and, in consequence, some licks contain far too much salt in proportion to their content of "phosphoric acid." When this is the case animals, in an endeavour to satisfy the craving for phosphate, eat more salt than is good for them. In putting forward the Departmental formulae, A, B, and C,† this feature was kept in mind and the proportion of phosphate kept high at the expense, under some conditions, of its palatability. Despite this, however, the phosphoric acid content was not always sufficient to satisfy the requirements of the animal, as the following instance with stud weaners will show. The owner had mixed a lick in accordance with formula C, which contains twice as much phosphate as salt, and half of the phosphate was in the readily available form of di-calcic phosphate. To use the owner's words—"The young sheep did not lick the mixture, they ate it." but a later report stated that the depraved appetite was not cured, and so the amount of phosphate was doubled, with satisfactory results. The palatability of the lick, in this instance, was maintained by an increase in the amount of molasses.

Even if the new di-calcium phosphate be mixed with its own weight of salt, because of its greater availability and higher phosphatic content, it will be of much better quality than Formula C, which contains salt equivalent to only half the weight of the phosphate. It is also slightly more valuable than the double strength mixture referred to. In addition it will not have the disadvantage of carrying the considerable percentage of gypsum which is present in basic superphosphate, and which serves no useful purpose and must be regarded as a diluent.

* Since writing this article I have learnt that the Cresco Fertiliser Company has also placed a concentrated di-calcic phosphate stock lick upon the local market.

† "Phosphatic Licks for Stock"—Geo. L. Sutton, *Journ. Agric., W.A.*, Vol. 5 (2nd Series), Dec., 1928, p. 897.

Commercial di-calcic phosphate is a tasteless powder which mixes readily with salt. Experiments are now proceeding to determine the amount of salt necessary to add to it in order to make it palatable and acceptable to stock. It is in a very fine state of division and, for lick purposes, it will require to be mixed with a small amount of molasses to act as a binder and as an appetiser.

Compared with Bonemeal, which is a convenient standard for comparison, di-calcic concentrate is 50 per cent. richer in "phosphoric acid" and each unit of this may be regarded as twice as available or useful as a similar unit in Bonemeal.

THE JARVIS FRUIT FLY LURE—LOCAL TESTS—PROGRESS REPORT.

L. J. NEWMAN, Entomologist.

The Jarvis Fruit Fly Lure was first officially published in the Queensland Agricultural Journal, November, 1931. The claim was therein made that this lure was equally attractive to the Mediterranean Fruit Fly (*Ceratitis capitata*), as it had proved to be to the Queensland Fruit Fly (*Chartodacus tryoni*).

The lure is a combination of imitation vanilla essence, household ammonia, and water.

It is a fact that the various species of Trypetidae react to various odours or lures. This we demonstrated as far back as 1907, when we discovered that petroleum oil attracted the males of the Mediterranean Fruit Fly. This stimulated further research, resulting in the pollard, borax, and water lure, and more recently, the discovery that the proprietary preparation known as concentrated Clensel was even more attractive.

With the object of determining whether the Jarvis Lure was a more effective one than those now being used locally, a set of experimental tests was commenced on the 5th February. Two glass jar traps of a capacity of ½ pint each were used in separate fruit trees. The Jarvis Lure was placed against Clensel as a control. In each tree a jar of each lure was placed and suitably marked to avoid confusion.

The traps have their positions changed each week, thus ensuring an equal chance of capturing the flies. The lures are renewed every 7 days and the fly contents counted and sexes determined.

The Jarvis formula, as officially given, is strictly adhered to, namely, ⅛ oz. of imitation vanilla essence, ½ oz. household ammonia, 26 ozs. water. The Clensel control was used at the strength we always advise, 1 part to 30 parts water.

The progressive results to date have proved that the Jarvis Lure has but a very slight attraction for the Mediterranean Fruit Fly in this State.

In view of these results, local growers are advised to continue with either of the lures as now advocated by this Department.

The test is being continued, and when finalised the relative captures of flies and their sexes will be given in tabulated form.

PASTURE RENOVATION.

IRRIGATION AREA (OBSERVATIONAL).

C. GILES (Dairy Branch) and H. K. GIBSONE (Irrigation Branch).

For purposes of observation, and with the object of demonstrating the possibility of rapidly improving poor pastures, a paddock was selected with the following characteristics:—

(1) Need for drainage.
(2) Possibility for irrigation.
(3) Low fertility; little, if any, response to fertiliser having been noted the previous season, probably owing to lack of aeration.

The ground on which the experiment was carried out is a chocolate loam, the herbage in evidence prior to treatment being:—

(1) Couch Grass of a very poor quality (harsh and lacking vigour);
(2) Guildford Grass growing to a height of approximately 4 inches and brownish in colour;
(3) Subterranean Clover—a few stunted plants.

First Stage.

Ploughing was considered necessary in order to facilitate—

(1) drainage;
(2) irrigation; and
(3) the preparation of a suitable seed-bed.

This was carried out in October last year, to a depth of 5 inches with a single furrow mouldboard plough, and left open for a fortnight. No suitable implement was available for further operations, and the country was lying thoroughly open, due to its couch-bound condition. Hoof cultivation was decided upon as the most economical way out, and with this object in view Sudan Grass was seeded at the rate of 12 lb. per acre—Potato Manure No. 2, containing superphosphate and ammonia in the proportions five to one respectively was broadcast at the rate of 1 cwt. per acre and harrowed in. Germination was good but aftergrowth poor, sufficient, however, to achieve the object, as being fed off twice before the end of January, trampling from stock consolidated the open ploughed land.

Second Stage, commencing on 2nd February, 1931.

It was decided to make further observations, as Couch was plentiful and commencing to show more vigour. Water was applied on 2nd February. Fertiliser—Sulphate of Ammonia at the rate of 1 cwt. per acre versus Nitrate of Soda at rate of 1 cwt. per acre. No Superphosphate. This was broadcast and well harrowed in five days after watering, this period being necessary in order to obtain a mulch.

Superphosphate was not applied, it being assumed that sufficient phosphates were available, although this assumption was probably not justified, and a dressing is always recommended when any fertilisers are being applied.

Both fertilisers gave good results, the Couch responding rather more quickly to the Nitrate of Soda. Little variation, however, could be noted later.

For the remainder of the summer the treated area was grazed rotationally together with older fields. The healthy colour and vigorous growth of the treated area was outstanding in comparison with the distinctly yellow colour of the older areas suffering from lack of drainage.

March, 1931.

Drainage was now commenced with the object of overcoming future trouble from surface water. Labour was scarce and it was necessary to curtail the work as much as possible, and Mr. London arranged to cut drains to a depth of 18 inches by 12 inches wide only. This, however, proved effective, and by the middle of April (one watering only intervening), the colour of Couch over the whole area was now healthy.

Mineral Deposit. It should be noted here that, following the March application of water, by which time drainage was complete, a white mark approximately 1 inch wide was to be seen along the drain 5 inches below the surface level, indicating a very heavy mineral deposit, now probably lowered sufficiently to be no longer detrimental to pasture grasses. Previous to drainage this deposit had been on the surface.

May, 1931. With a view to obtaining winter grazing and a superior type of pasture, the following seeding was carried out early in May (after drastic harrowing):—

Perennial Rye Grass—7 lb. per acre.
Subterranean Clover—6 lb. per acre.

Germination was good but growth generally was unsatisfactory, probably owing to fertilisers being omitted when sowing these seeds, grasses in particular showing little inclination to make headway, it being necessary to search closely in order to observe them.

Intermittent grazing, however, was carried on until early September, when a further dressing of fertiliser was applied; this consisted of—

Superphosphate 2 parts + Sulphate of Ammonia 1 part over the major portion at the rate of 1 cwt. per acre, and

Superphosphate 4 parts + Sulphate of Ammonia 1 part over two lands running through the centre, with the object of ascertaining if possible whether phosphate or nitrogen was lacking.

Harrowing. The whole area was lightly harrowed with the Sunblade implement after fertiliser application and closed from stock for six weeks.

Results.

No. 1 dressing Superphosphate 2 parts, Sulphate of Ammonia 1 part, gave excellent results, both Grasses and Clovers responding rapidly.

No. 2. Superphosphate 4 parts, Sulphate of Ammonia 1 part, both grasses and clovers responding less rapidly, probably less than one-tenth edible fodder being available when pasture was thrown open for grazing.

The main head ditch for irrigating purposes was altered in direction, and by shortening the lateral irrigation channels it was found possible to irrigate the whole area thoroughly in half the time previously taken.

The 13 acres of irrigable flat were divided into four fields, and during the present summer have been grazed rotationally. The figures below will indicate the economic value of controlled grazing combined with irrigation:—

	1930.	1931.
Total butter fat produced	2,632	2,977
Butter fat per cow	188	212
Butter fat per acre	68.2	74.4
Average cost of feed per month ..	£8	10s.
Fertilisers applied	£12	£20
Tons of hay conserved	Nil	8 tons

The feed bill was therefore reduced £90 per annum, at an increased cost in fertilisers of £8.

The increased value of butter fat was £17 5s.

Summary.

It appears from these observations—

(1) That drainage is absolutely essential, neither summer nor winter growers giving satisfactory results prior to it.

(2) Hoof cultivation may be applied to advantage in order to create a sufficiently compact seed-bed for the inclusion of grasses.

(3) Little time need be lost so far as stocking is concerned, the carrying capacity having been considerably increased over the whole period.

(4) That the farmer should take steps to discover by experiment the weakest link in the chain of nutritive substances in his land, as weakness in any one link cannot be compensated for by strengthening others.

If, as in this instance, the natural supplies of nitrogen are deficient, no improvement in the crop can take place by additional supplies of phosphoric acid or potash. This also applies to other essential conditions of growth, soil temperature, aeration, etc. If one or the other is unsatisfactory, then again growth will be limited or non-existent.

WHEAT SEEDING.

THE CORRECT DEPTH TO PLANT.

I. THOMAS, Superintendent of Wheat Farms, and H. A. PITTMAN, Plant Pathologist.

A number of inquiries have recently been received from wheat farmers as to the correct depth to sow the grain.

In this connection the wheat seedling itself provides us with the best answer to the question *re* the proper depth of seeding, inasmuch as no matter how deeply the seed is sown, provided it is able to germinate and develop normally, it will always form its permanent root system at about 1½ inches below the surface of the soil. The primary or seedling root system which forms at the time of germination normally dies away very early in the growth of the wheat plant.

If one carefully digs up well-developed wheat seedlings, when the seeds have been planted, say, 2½ inches to 3 inches deep, one will find that there is an inch or so of thin seedling stem above the seed, and between the seed and the point where the permanent root system is being formed. The deeper the seed is planted the longer is this seedling stem segment.

On the other hand, if the seed is planted about 1½ inches below the surface of the soil, the permanent root system will develop at about the same level as the seedling root system. This means that the time and energy which would otherwise be wasted in the development of the seedling wheat plant is conserved, and a more vigorous and healthy plant results, other things being equal, than if the wheat had been planted deeper in the soil. Further, with deep planting there is always a danger of a hard crust forming on the surface

of the soil before the young seedling can break through, with the result that a considerable number of seedlings may die. This failure is often attributed to malting.

Deep planting often indicates an improperly-prepared and improperly-consolidated seed bed.

It has been found that the deeper the seed is planted the greater is the percentage of "bunt" and "flag smut" in the crop, owing to the fact that infection with these diseases takes place during the germination of the seed; the possibility of infection ceasing with the breaking of the first leaf through its little white sheath (*coleoptile*). "Take-all," "Root-rot," and "Foot-rot" are also made more serious through deep seeding, and there is some indication that the same thing applies to frost injury of wheat stems in the spring.

As indicated above, then, the proper depth to plant wheat under normal conditions, is about 1½ inches to 2 inches below the surface of the soil—an ideal mulch at seeding time being about that depth. Should the mulch, however, for any reason, be very much deeper, it might be desirable to sow deeper when planting early in the season. The reason for this is that light rains falling before the general winter rains may germinate the seed, but may not be sufficient to maintain it for any length of time if planted closer to the surface.

PRODUCERS' MARKETS CO-OPERATIVE, LIMITED.

QUARTERLY REPORT.

Fruit: Heavy fruit supplies forward for December sales to a good demand for prime fruit. Stone fruit of prime and large grade sold to a steady demand. Peaches were short throughout, the quarter selling at high values. Valencia oranges and lemons were in keen demand throughout. New season apples of good quality maintained their prices, but with the increased supplies of cooking varieties, values eased, only large sizes being in demand. With the exception of a few sales, nectarines were also short-supplied and in keen demand.

Tomato values at the December sales were satisfactory, but with the heavy supplies forward the market became over-supplied at the latter part of the period under review and values slumped, the factory taking the bulk of supplies.

Bartlett pears were also marketed during the end of this period with values firm for good and clean fruit.

Vegetables: Steady supplies forward. Potatoes from the metropolitan area are practically finished. The crop generally was lighter than usual, but values were better than for some years. Pumpkins were marketed early in the season and values were firm, but during the last month supplies increased and immature lines caused prices to recede. Swedes of good quality were very short, and a good demand exists. Cabbage was fairly plentiful early in the period, but supplies are now on the short side with firm values. Beans were fairly plentiful, but growers experienced a better season this year than last. Peas also were a much better value. Water-melons were plentiful this year, but the

majority of the crop show the signs of the dry weather and are very small. There is a brisk demand for all large lines. Rock-melons were also plentiful and values steady. Onions: The crop was lighter this year and values are firmer in consequence, prices at the moment being very high. Rhubarb was in steady demand all through. Celery of good quality is short, but inferior lines plentiful. Bunch lines heavily supplied, and the demand generally weak. Lettuce in good demand.

Eggs: During the quarter under review, egg supplies were maintained from 13th November to 2nd December with values fluctuating in accordance with the supply and demand, and ranging from 9d. to 11d. for metropolitan new laid hen and standard; 8½d. to 9½d. country new laid, and 7½d. to 8½d. country stores. After 4th December a number of clients ceased export operations, with the result that supplies increased and were greater than the demand with a corresponding decrease in values, metropolitan new laid hen and standard realising from 6½d. to 10½d.; country new laid 6d. to 8½d., and country stores 5½d. to 7½d. We take this opportunity of pointing out that about this time supplies from the country had increased, and were hard to quit at satisfactory prices owing to a number of cases consigned from long distances arriving in a bad condition owing to the excessive heat. On 19th December export operations ceased with larger quantities coming on to the local floor, however, the Christmas trade helped to firm the market temporarily, metropolitan hen and standard selling at 8d. to 10½d., country new laid 7d. to 8d., and country stores 6d. to 6½d. With Christmas over, supplies were still heavy with prices easier throughout, but at this time the local floor was again relieved by a number of growers cool storing large quantities and an agent pulping, this had the effect of making the demand equal to the supply and prices rose accordingly, metropolitan new laid hen and standard 10½d. to 1s. 3½d.; country new laid 6d. to 1s.; country stores 5½d. to 7d.

At the end of January cool storing was finished with the floors becoming heavily supplied, and prices showing a tendency to ease on all metropolitan lines. At present egg values are weak, and with a large number of eggs in cool storage it is a difficult proposition to forecast the tone of the egg market in the near future.

Poultry: During the quarter under review poultry supplies were heavy from November up to Christmas, with good prices offering for all prime lines. Aged and half-grown birds were hard to quit at satisfactory values. Prime cockerels realised up to 10s., with the average ranging from 7s. 6d. to 9s.; prime hens to 7s. 3d., wtih an average of from 5s. to 6s.; prime muscovy drakes to 15s. 6d., average 9s. to 13s. 6d.; prime muscovy ducks to 9s. 9d., average 6s. to 7s. 6d. Prime turkey gobblers to 43s., average 18s. to 30s.; prime turkey hens to 20s., average 11s. to 15s. The highest prices realised were about Christmas time, when a considerable improvement was shown in the quality of the birds submitted for sale.

Since Christmas supplies have been moderate, with good values for prime cockerels. Muscovy ducks and drakes have been heavily supplied, with low values offering. There have been no turkey hens or gobblers offering. Aged and half-grown birds have realised low values, and are hard to quit.

LIVE STOCK AND MEAT.

For the information of readers of this "Journal," the following particulars have been supplied by Messrs. Elder, Smith, & Co., Limited, Perth:—

COMPARATIVE NUMBERS OF STOCK SOLD AT METROPOLITAN FAT STOCK MARKETS.
FOR MONTHS OF DECEMBER, 1931, JANUARY AND FEBRUARY, 1932.

	DECEMBER.				JANUARY.					FEBRUARY.		
	2.	9.	16.	22.	6.	13.	20.	27.	3.	10.	17.	24.
Sheep	10,093	8,556	15,144	10,215	11,857	12,253	13,668	11,088	7,558	9,773	10,585	8,930
Cattle	534	464	387	394	558	519	545	603	476	539	665	656
Pigs	1,047	1,058	2,403	998	1,829	1,819	1,739	1,828	1,450	1,327	1,392	1,563

COMPARATIVE VALUES PER POUND.

Mutton	3d.	3½d.	3¼d.	3¼d.	3⅜d.	3⅜d.	3¼d.	2⅜d.	3d.	3¼d.	3d.	3½d.
Beef	3¾d.	3¾d.	4d.	4⅛d.	5d.	5d.	4⅜d.	4d.	4⅛d.	4⅛d.	4⅛d.	4¼d.
Pork	5½d.	6½d.	6⅜d.	6⅜d.	6½d.	6½d.	6½d.	6½d.	6⅜d.	6½d.	6½d.	6½d.
Bacon	5½d.	5½d.	5½d.	5½d.	5½d.	5½d.	5½d.	5½d.	5½d.	5½d.	5½d.	5½d.

MARKET REPORT.

Messrs. H. J. Wigmore & Co., Ltd., of Wellington Street, Perth, have supplied us with the following information regarding chaff offered at auction in the Perth Railway Yards for the period December to February (inclusive). In all cases the prices quoted are for f.a.q. to prime wheaten chaff, packed in new bags:—

	Maximum.	Minimum.
	£ s. d.	£ s. d.
December, 1931	3 10 0	3 7 6
January, 1932	3 12 6	3 10 0
February, 1932	4 10 0	4 5 0

Fair supplies of f.a.q. to prime wheaten chaff arrived during the months of December and January, but we are very pleasad to report that towards the end of January the value firmed considerably, and in several instances f.a.q. to prime wheaten chaff sold at £4 per ton. During February short supplies were experienced, and the market advanced still further to £4 10s. per ton. We are pleased to advise that at the time of writing the market remains at around this figure, and in some instances consignments have sold at from £4 12s. 6d. to £4 15s. per ton.

Oaten Chaff.—In December prime green quality sold at £3 10s., and f.a.q. found buyers at £3 7s. 6d. per ton. During January several consignments of prime quality made £3 12s. 6d., and f.a.q. £3 10s. per ton. In February few consignments of prime quality arrived, and there was a good inquiry for same at £4 10s., and for f.a.q. at £4 5s. per ton. We are pleased to advise that, at the time of writing, consignments are still selling at these figures.

Oats.—Throughout the period under review the market remained firm, the quotations being as under:—

December, January and February.

Good heavy feed, Guyras and Mulgas ..	2s. to 2s. 3d. per bushel.
Good feeds	1s. 9d. to 1s. 10d. per bushel.

Wheat.—During December f.a.q. sold at 3s. 4d. per bushel, and second grade at from 3s. 1d. to 3s. 1½d., quality slightly affected with smut realised from 2s. 6d. to 2s. 9d. per bushel. In January heavy consignments came forward and the market eased slightly, f.a.q. made 3s. 3d., second grade 3s., quality slightly affected with smut realised from 2s. 9d. to 2s. 10d. per bushel. During February we are pleased to advise that the price of f.a.q. wheat advanced to 3s. 6d. per bushel, second grade changed hands at from 3s. 2d. to 3s. 3d., samples containing smut ball sold at 3s. 2½d., consignments affected with smut sold at 3s. to 3s. 1½d. per bushel.

METEOROLOGICAL INFORMATION.

STATIONS.	TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.	
	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum.		For Month.	Average.
	Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.		
	DECEMBER, 1931.						JANUARY, 1932.						FEBRUARY, 1932.					
					inches.	inches.					inches.	inches.					inches.	inches.
Chapman State Farm	95·3	107·3	63·9	54·0	0·56	0·22	95·0	111·7	67·7	58·1	1·18	0·27	95·3	108·3	66·8	57·2	0·00	0·48
Geraldton	88·7	107·6	66·6	57·6	0·47	0·16	85·0	102·0	70·0	59·8	0·44	0·22	87·9	108·8	69·0	59·0	0·00	0·30
Walebing	94·4	108·0	63·3	47·1	0·59	0·48	97·1	109·5	66·4	53·3	0·21	0·35	94·6	106·0	62·4	50·2	0·00	0·52
Perth	89·1	101·2	66·6	55·5	0·37	0·58	88·4	106·4	67·5	57·7	0·19	0·34	88·0	102·0	65·5	55·0	0·00	0·42
Kalamunda	88·7	100·4	63·1	52·9	0·77	0·81	89·4	103·0	64·7	56·1	0·25	0·55	89·2	101·9	62·4	51·2	0·00	0·67
Bunbury	83·1	93·0	60·6	49·0	0·40	0·58	83·0	100·0	61·9	48·0	0·37	0·43	82·6	91·0	60·5	49·0	0·05	0·55
Bridgetown	91·9	105·5	53·9	39·0	1·36	0·77	89·4	108·0	55·8	44·8	1·60	0·54	90·0	103·0	54·5	42·2	0·11	0·65
Albany	73·8	92·0	58·9	50·0	2·83	1·16	74·6	86·0	60·8	53·0	1·31	0·84	74·4	100·1	60·6	54·0	0·51	0·94
Merredin State Farm	92·4	104·9	63·1	51·5	0·40	1·54	95·7	108·1	67·3	55·2	0·51	0·52	92·6	105·9	62·4	50·9	0·11	0·56
Northam	93·9	105·0	63·5	52·0	0·28	1·35	96·5	108·0	67·9	56·0	0·09	0·28	94·3	106·8	63·2	54·8	0·00	0·38
York	92·6	104·5	61·5	51·0	0·77	1·41	94·6	106·0	66·2	55·5	0·05	0·31	92·6	105·5	61·3	54·0	0·00	0·45
Narrogin State Farm	89·7	101·0	56·5	48·0	0·31	1·58	90·8	105·0	60·1	50·4	0·65	0·32	87·9	100·3	55·4	42·2	0·00	0·58
Katanning	89·6	102·3	56·2	47·1	1·31	1·62	88·6	104·6	59·4	50·8	0·55	0·37	86·7	103·0	56·8	47·3	0·06	0·57
Cape Leeuwin ...	74·8	92·8	63·4	56·4	0·44	1·86	74·1	81·0	64·7	61·0	0·20	0·67	76·7	94·0	64·5	58·0	0·21	0·85

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No. 37.—*Conference of Producers, 1910 and 1912.*
No. 46.—*Fruit Packing and Marketing and Exporting of Fruit.* J. F. Moody and J. Ramage. Price 1s. 6d.
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The Management of Poultry under Western Australian Conditions, by W. T. Richardson Poultry Adviser.

This is a most useful and valuable book, not only for beginners, but to all those who keep fowls for pleasure and profit. It deals fully with all matters connected with the industry, including Breeding, Feeding (for stock birds or egg production), Incubating, Brooding and Care of Chicks, Marketing (eggs and poultry), and all matters of use to the poultry-keeper. It also fully describes symptoms of various ailments and diseases and simple treatment for same, and, as the book was written to suit *local conditions*, every poultry-keeper should have a copy by him. Price, 2s.

The Pruning of Fruit Trees, by J. F. Moody, Fruit Industries Commissioner:

This publication contains numerous illustrations, being reproduction of photographs taken in this State, of pruned and unpruned trees, which make the details set out in the letterpress particularly easy to understand. Price 2s. 6d.

Fruit Packing and the Marketing and Exporting of Fruit, by J. F. Moody, Fruit Industries Commissioner, and J. Ramage, Packing Instructor:

This publication contains invaluable information on packing and grading fruit for local and export markets. It is freely illustrated, and no fruit-packing shed should be without a copy. Price 1s. 6d.